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Dear Sir: I hereby signify my desire to become a member of the American Forestry Association. One dollar (\$1.00) for annual dues is enclosed herewith.

Very truly yours,

Name _____

P. O. Address _____



CONSERVATIVE LOGGING IN THE SOUTHERN APPALACHIANS

A large oak at Biltmore cut and made into cord wood without injuring surrounding small growth

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LOGGING FOR PULP WOOD IN THE SOUTHERN APPALACHIANS

By GUY CARLETON HAWKINS

DO YOU know where the paper came from which is before you? Of course, it came from Washington, D. C. But that is neither the beginning nor the end of its life story. The publisher received the paper from the paper mill; the paper mill received its pulp and fiber from the pulp mill, and the pulp mill took the wood from the forest to make the pulp.

From what forest?

It came, perhaps, from the forests of the Southern Appalachians, those beautiful hills and valleys which are fast becoming treeless wastes.

Are you interested to know how the forest is made into AMERICAN FORESTRY?

Let us fly by means of a mental airship to the top of one of those long, broken crests of the Blue Ridge Mountains known as the "Balsams." Looking down the mountain-side, we see that denuded tract described to us again and again by those who would protect the forest. At our back is the magnificent stand of balsams and spruce towering high into the air, while here and there in an open space is a twisted, gnarly hardwood.

The axmen with their saw and ax are at work near by, and at their warning cry of "Timber!" a gigantic balsam cracks, sways, and then sweeps to the

ground with a mighty crash and is still again, among the tangle of rhododendrons and fallen tree-tops. Soon the tree is stripped of branches, dissected into twenty-five-foot lengths, and our "paper" is on its way to the mill. Even now we see the slow-moving bodies of the oxen come crawling up the trail. With some difficulty, the driver gets the team beside a log; the chain is hooked on and down they go along the winding trail until they come to the so-called log-string.

Let us follow and watch the string of ten logs, averaging twelve inches in diameter, "dogged - and - chained" together. We must now wait a few minutes for the four-ox team which is to "snake" or "skid" the string of logs out, so let us look about us.

It is the end of June, and everywhere the huge clusters of pink, red, and white rhododendron blossoms are to be seen. But that is not all. On every side is the unsightly path which the axmen leave behind them. Brush, dry tops, and slash of every description is strewn or piled about the rhododendrons, waiting for that fatal day when the forest fire in a cloud of smoke comes sweeping up the mountain. Then, here and there we see the crooked or leaning yellow birch or silver bell waiting to be blackened on that same day.



LOGGING FOR PULP WOOD IN THE SOUTHERN APPALACHIANS

Bringing in a string of logs

Crack! Like a pistol shot, the driver's whip brings us back with a snap to the ox-team coming for the logs. A few minutes—another crack of the whip, at which every beast leans into the yoke, and our "paper" is on its way again. The trail down which we follow the logs is a gully three or four feet deep, partly dug and partly worn into the ground; and in the bottom of it is a little stream of water which makes a slippery mud over which the logs glide easily. A walk of three-quarters of a mile brings us to the log yard, where the logs are cut up into billets. Two at a time, the string is finally brought to the pile and the cattle amble off after another load.

The logs are now ready to be sawn and split up into five-foot billets preparatory to being shot down the pole-chute to the creek below. On a rainy day, when the chute is wet, a hundred-pound billet will shoot down a forty-per-cent grade at the rate of a mile a minute, leaping from the end of the chute far out into space and striking the stony creek-bed only three or four

times before it comes to rest a thousand feet below. A stirring scene it is to watch these billets jump from the chute, crash on the ledge below, and leap again, until finally they lie quiet in the pile, just above the so-called "wet-chute," far below.

But come! the splash dam is about to be opened, and we must be on hand. Away up on the side of the mountain man has constructed a dam, behind which he holds a little pond of water. For a day and a night the water from a tiny brook has been collecting. A chute from the top of the mountain brings billets directly into the quiet pool and those from another chute are run into the creek just below the dam. As we stand watching, of a sudden the gate is loosened, flying up, and out pours the water, carrying the billets down the steep mountain-side in a whirling, dashing mass. Oftentimes the billets are broken and split, but no damage is done, for when they reach the mill they will be cut to bits. But let us go back to the dam and see how it was constructed. Though only fifty feet

across and twenty high, it yet takes twenty-four hours to fill it from the little stream coming down the mountain. On the inside, the planks slant toward the slope at an angle of forty-five degrees to give the structure strength; it is fifteen feet through at the base and only the width of a log on top. The gate, which swings from the top, is only six feet square, and yet all the water which has been collecting for the last twenty-four hours rushes through in less than two minutes.

Following along down the creek-bed, slipping and sliding much of the way, we come to the huge, widespread pile of billets, and, farther on, to the wet-chute. Here six men are hard at work throwing the billets into the chute. This chute is made of smooth planks, forming a V-shaped, nearly water-tight trough, into which the water of the creek is turned. The water rushes down, carrying with it the billets which the workmen are throwing in. They must work as fast as possible, for the water will soon be dammed back for another splash.

After admiring the work of the little stream for a few minutes, we pass along down to the main creek of the valley. Here work begins to take on a more civilized aspect. A narrow-gauge railroad has been built along beside the creek in the valley, and there is the little engine waiting for the eight or ten cars to be loaded with the billets. Between the track and the chute is the big pile of billets brought down by the water. When the cars are loaded no time is lost in getting under way for the pulp mill, some ten miles distant.

To follow the wood to the mill and watch it go through the various processes, from the shattering of the billets to the rolling of the white fiber into thick sheets, would take us another long



LOGGING FOR PULP WOOD IN SOUTHERN APPALACHIANS

Typical pole chute, down which the billets come from the slope above

day; so let us go up the mountain again, to see the Lumber Jack in camp.

Up, up, up the winding trail we climb, until at last we reach the crown of the ridge, which is the timber line as well, for the other side has not been logged as yet. The long climb will have its reward for us if we but go up a neighboring knob to rest, with all the world below us. In the distance, ridge after ridge rolls into sight, and at first



LOGGING FOR PULP WOOD IN SOUTHERN APPALACHIANS
A spruce billet leaping from chute at the rate of a mile a minute



LOGGING FOR PULP WOOD IN SOUTHERN APPALACHIANS
The camp in the clearing

the magnitude of it all carries us away with a burst of exultation; then a sense of our insignificance takes its place, bringing our thoughts to the smaller of nature's charms. Who does not love the quiet path, the singing of the happy working birds, the rippling laughter of the creek that runs along as if the whole world depended upon its swiftness? Who does not care to stroll among the tall, straight trees and over the soft mosses, as did our forefathers of long ago? And now, as we stand here, we have them all before us. Far down in the deep valley the creek winds between the steep hillsides, carrying, little by little, a pebble or grain of sand on towards the ocean. From the creek to the blue ridges among the clouds, under those broad green shields, we find the playground for all our true American children. Do we want this great play-ground, or do we want the barren waste on the opposite side of the ridge?

But we have climbed the mountain to see the lumber camp, so let us find it. Five minutes' walk down into the standing trees of the slope brings us to a clearing, and it is here that the camp is located. You may ask why the camp is so far from the center of activities. It is principally to prevent destruction by the fires which the woodsman knows are soon to sweep up the logged mountain-side. The woodsman also knows that unless the season is extremely dry the standing spruce and balsam are as fireproof as is a slated roof, and consequently we find his camp in their midst.



LOGGING FOR PULP WOOD IN SOUTHERN APPALACHIANS

Small splash dam just after opening the gate

It is nearly sundown, and the workmen are coming in from the different points of the operations to the coarse supper prepared for them. The log cabin in which they live is strongly constructed, and although rather dark and rough inside, affords proper protection from the weather. A short distance from the cabin is the cattle-shed, where we find our four-footed friends quietly munching their meal, with now and then



LOGGING FOR PULP WOOD IN SOUTHERN APPALACHIANS

The creek dashing down the mountain side, carrying with it a multitude of billets

a stamp of the foot or switch of the tail to keep the flies at a respectful distance. A couple of black "porkers" are still hunting for a last dainty morsel before "turning in" for the night.

After we have satisfied our curiosity, the camp boss comes out and is quite willing to have a chat with us. Among

other things, he tells us that it costs \$8 per cord to cut and deliver the wood to the pulp mill.

Does that mean anything to us? Eight dollars per cord, and nearly all of it for transportation. The mill must have wood, and next year the railroad is extended farther into the mountains and the cost will increase, so that every balsam and spruce must be cut to pay for the extra expense. It is not necessary to say that the price of paper must rise in a parallel line with the cost of production. Shall we be ready to pay those prices, or shall we cry out as we recently did at the high price of meat? Should we not be willing to pay a few cents more for our paper at present, so that the lumberman in the forest could practice a little conservative forestry? It is the same with the hardwoods which are being cut for lumber. If we would have them conserved we must pay the lumberman for conserving them. We could easily pay a few cents more per thousand feet today to prevent an increase amounting to dollars in the future. And so if we wish to have conservative forestry practiced we must pay for it, as we must pay

for all things which are good.

Having learned our lesson for the day, we stroll up to the knob on the ridge once more and there, as the sun drops slowly behind the distant Smoky Mountain, we watch night fall over the Hetch-Hetchy Valley of the Appalachians.

THE FOREST PARKS OF NEW YORK

By JOHN S. KENNEDY

Secretary, Public Service Commission, Second District, Albany, N. Y.

THERE is no section of country in all the world with more beautiful forests than the populous State of New York. To the thoughtless observer it may seem strange that, with its great and apparently closely settled population, it takes the lead of all the States in acreage of state-owned forest preserves, but such is the fact; and it is now the established policy of the State to constantly increase its acreage.

In the early days there was no section of the United States that contained a more dense, evenly distributed, or valuable forest than that within what is now the State of New York. In fact, New York State was the home of the lumberman, and saw the beginning of actual lumbering in the United States. Like all the States in the Union, like all countries where civilized man has dwelt for any length of time, the destruction of the forests by lumbering and other means has gone too far, and evil results therefrom began to appear and make themselves felt.

As New York was the first State where lumbering was done on a large scale, so it was the first State to take positive and active means to stop the timber waste; to manage, control, and replenish the forest growth. The question was discussed during the time of Governor DeWitt Clinton, but the first move was in 1872, when Governor Horatio Seymour secured an appropriation from the legislature for making a forest survey.

The Adirondacks at that time were an unbroken wilderness, and the bear, the elk, the moose, and the wolf roamed about with little fear of interruption. The real beginning, however, was made by the enactment of a law in 1865,

providing for a commission to supervise the forest regions. From that time much reclaiming work was done, many experiments in tree garden work made, and a considerable amount of wild forest land acquired by the State in the Adirondack and Catskill Mountain regions for a State Forest Preserve and some of the waste land planted to trees.

By statute, in 1892, confirmed by the Constitution in 1895, a park was established in both regions, composed of certain lands in sixteen counties. In the Constitution the State has laid down its established policy providing that "The lands of the State, now owned or hereafter acquired, constituting the Forest Preserves as now fixed by law, shall be forever kept as wild forest lands. They shall not be leased, sold, or exchanged, or be taken by any corporation, public or private, nor shall the timber thereon be sold, removed, or destroyed."

The first years of State regulation were not very effective. True, great tracts of land were acquired, but no intelligent effort was made to bring the importance of the forest in all its bearings to the attention of the general public or to induce lumbermen when cutting to leave some reasonable forest covering on the hillsides and mountain tops, or to leave seed trees of the cone-bearing species at short intervals to promote natural re-seeding. No consideration was given to the diminishing water supply or to the cause of its diminution. Little care was used to protect the forests from ravages by fire.

It is true that a firewarden system was established and fairly good work done, yet year after year many thous-

and dollars' worth of valuable timber, and even the more valuable soil itself, was destroyed. Lumbermen, speculators, and dishonest men robbed the State of its timber, and through any and many pretenses wantonly took and used much of the State's forests with little or no thought except to get as many dollars out of it for today as they could. They left the unused parts of trees, logs, limbs, and tops where they fell, forming a dangerous fire trap, which thus created additional danger to all the forest growth left uncut. Great fires raged through the cuttings and swept the debris up in mighty conflagration destroying everything in its path, standing trees as well as down timber. The railroads, by careless management of their locomotive engines and rights of way, added to the danger and destruction.

During the administration of the late Governor Higgins, in 1905-6, and continued under Governor Hughes, the matter of the preservation of the Forest Preserve was taken hold of with a firm hand and the mandates of the Constitution strictly carried out. Trespassers and timber thieves were prosecuted and punished, tree planting has been carried on and encouraged among the people.

Concededly the greatest agency of destruction to the forest was the coal burning locomotive, which in its ever onward rush through the country, scatters destructive coals and sparks along and upon, and even outside, the railroad right of way.

Acting on the petition of the Forest, Fish, and Game Commission the powerful Public Service Commission this year ordered the installation of oil burning engines on the lines of the New York Central and the Delaware and Hudson, operating through the Forest Preserve, and the order has been obeyed. The success of this move is best attested by the statement that while in other parts of the country, this year has been one of the worst for forest fires, there has not been one fire of any great consequence in New York State.

This extreme action on the part of New York State followed the great devastation of the season of 1908, when 368,072 acres of wooded land in the Forest Preserve were burned over, villages destroyed, and the property loss and suffering of inhabitants of the district affected most serious.

The lesson of 1903, when 465,000 acres were burned over and a loss of \$3,500,000 incurred, had not proved a warning and was so soon forgotten that in 1908 the railroads, as well as the State, found themselves practically unprepared for the prevention of fire damage. The 1908 fires in the Adirondacks destroyed lumber and logs to the amount of \$126,539, and buildings, the value of which was \$44,395, besides the loss to State lands amounting to \$644,000.

On thousands of acres which were first burned in 1903, the 1908 fires consumed the vegetable matter, or "duff," which forms the floor of the forest, and the destruction of which will prevent reforestation for many years. The Long Lake West fire, conceded to be a railroad fire, was one of the most disastrous in the history of this region. In places the soil burned down to the rocks. The hamlet was wiped off the map, and even the railroad station and cars standing on the tracks were burned.

In addition to the order made by the Public Service Commission safeguarding from railroad-set fires, a comprehensive system under the Forest, Fish and Game Commission is observed over the entire Forest Reserve. A complete fire patrol is maintained. Observation stations have been erected on twelve mountain tops. From each a territory within a radius of twenty miles can be clearly observed through the aid of powerful field glasses. The man in charge is provided with a map of the territory, a range-finder, a telephone, and field glasses.

Every fire patrolman is within telephone communication of each observation station. The observation station attendant sees a smoke curling up ten

miles away; he locates it by his map and range-finder, telephones the nearest patrolman, and in a few minutes men are at the place to extinguish the fire. More than two hundred fires started last season, and yet under this system, they were extinguished quickly and with little or no resulting damage.

One hundred miles of telephone line within the forest has been constructed and acquired by the Commission, connecting nearly all the more dangerous sections and facilitating the work of forest protection. The patrolmen, supervisors of towns, and the people generally have entered into the spirit of the work. Nearly all persons going into the woods have been especially warned to be careful about building fires and thoroughly instructed how to start camp fires, particularly as regards their extinguishment.

Today, twenty-five hundred square miles, or 1,641,523 acres comprise the State's own preserve which is valued at nearly half a billion dollars; and fully two-thirds as much more acreage and value estimated at one hundred millions, is owned by corporations and individuals. The total acreage of all the other State forest preserves in the country is but 2,837,605 acres. The Adirondack preserve contains 1,530,559 acres; a gigantic plot of never ceasing delight, bewildering in its scenery, indescribably bracing in its air, abounding in mountain, forest, and stream, and wood trails of surpassing beauty. Its yearly visitors number a half million souls.

The Catskill preserve has 110,964 acres; a fairyland of wooded delight, rich in historical relations—where Rip Van Winkle slept his wondrous sleep—and is located but a few hours run from New York City. Its health restoring hills and dales have won world-wide fame.

In accordance with the wishes of the late Edward W. Harriman, his widow, Mary W. Harriman, has offered, and the State has this year accepted, a tract of about ten thousand acres of land situated in Orange and Rockland counties, to be held in perpe-



Lookout Tower on Hunter Mountain

tuity as a State Park; and in furtherance of the same object to give to the State, or to such board or commission as may be authorized to receive and administer the trust, the sum of one million dollars. Mrs. Harriman stated that it was her husband's wish, and it is her expectation, that this fund should be used by the State to acquire other parcels of land adjacent to the above-mentioned tract and intervening between it and the Hudson river, and



Observation Station on Summit of White Face Mountain. Altitude, 4872 Feet

in the improvement of the whole, so that the park may ultimately have some portion of river front and thus by improved accessibility be rendered more useful and more beneficial to the people of New York City and the neighboring counties.

In addition to the munificent Harriman gift, the Palisades Park Commission, acting with a similar New Jersey Commission is preserving and protecting the scenic beauty of the mountain lands known as the Palisades, along the west bank of the Hudson river. Already private contributions of land and money, amounting to \$300,000 have been received from individuals, and \$400,000 contributed by the State of New York, and \$50,000 by the State

of New Jersey, to carry on the work.

The third great park, known as Highland Park, consisting of the Harriman gift and Palisades lands, will extend from Fort Lee to Newburgh along the shores of the picturesque Hudson and back into a country full of scenic beauty and historic lore. Private subscriptions, amounting to \$1,625,000 have been received from seventeen individuals, in addition to the Harriman gift, to develop this park. The list was headed by John D. Rockefeller and J. Pierpont Morgan, for a half million each. This gift is to be supplemented by an appropriation by the State of New York of another quarter of a million.

With these three great state preserves, surely New York can challenge the whole world to produce within an equal area such glories of nature so carefully preserved. The Association for the Protection of the Adirondacks, organized in 1901, has been a potent force in the conservation of New York State's wealth of forest possessions. The president, Hon. Henry E. Howland, Vice-President John G. Agar, and Secretary Edward Hagaman Hall, as well as its officers in general, have given much of their time, study, and means in every effort tending toward the preservation of the State's forests.

There can be no argument but that this large outlay of money and effort on the part of the State is fully justified by the results. The efforts being made in New York State are attracting the attention of the entire country, and can not fail to prove a powerful stimulus to forest conservation.



MANAGEMENT OF CUT-OVER LANDS

By GEORGE H. EMERSON,

of the Northwestern Lumber Company, Hoquiam, Washington

(This address was delivered by Col. Emerson at a meeting of the Washington State Commission on Forest Legislation in Seattle, October 8. As sane conservation doctrine by a practical lumberman, and as an answer to the self-interested ideas of certain large timber owners in California, referred to in the last number of this magazine, it deserves wide reading.—Ed.)

CHOPPINGS differ in different parts of this state. East of the mountains our pine grows with little or no underbrush, and when the trees are cut there is no doubt but what the tops should be limbed, piled in openings and burned, leaving the ground clear to reproduce timber, or grass, or both. West of the mountains all is different, and it is respecting west of the mountains I write. Here choppings divide into those where the ground is suited to agriculture and those where it is valuable only for timber. It is to choppings on land valuable only for timber that I wish to confine your attention. The greater portion of our choppings come under this head—a much larger portion than is commonly thought

It has been the custom of the American people to burn their choppings. Beginning with the landing of the Pilgrims the fires have never been out when the weather permitted the choppings to burn. In all things Americans have looked for quick returns, always ready to discard or destroy all that could not be turned immediately to their use, or sold at a profit.

It is said, by those who know, that more natural gas is going to waste than would furnish fuel for all purposes if utilized, gas that has been tapped when drilling for oil and discarded when not oil; that more coal is destroyed by mining the lower high grade strata, and allowing all above to fall and mix with dirt, than is at present used. Cattle were once killed for hides, buffalo

for robes, elks for horns and teeth, deer for pelts, and forests were burned for hunting ground, but in nothing has this waste been more marked than in the use of our soil.

As a nation we have cropped with little attempt to conserve or replace that which we have taken from the farm. The result is shown in the older parts of our country. Farms are abandoned because exhausted; their values have steadily declined and their owners have drifted to apply the same methods to new lands and on these new lands they return nothing to the soil, and soon are reduced to twelve bushels of wheat where they once raised twice that amount, and where countries tilled a thousand years, by careful methods, harvest three times that much.

All timber lands have accumulated leaf mold that if saved and mixed with the subsoil would render it productive, but this mold is combustible when dry, and from Maine to the Pacific it has been burned, because of the easy method of reaching the ground—the old process of killing for hides, horns and teeth. If our settlers could carefully save the forest soil they now burn, or clear their lands without destroying it, they would make a great stride in conservation.

It is so easy to burn a chopping and see that which is not wanted drift away in smoke; so handy after the heads are removed from the grain to have the fire clear the stubble for the plow; so nice when one wants a new home to burn up the old one, instead of

the slow process of pulling it down and saving the material.

Here in the west the ground where our timber grows is covered to the depth of several feet with mold and moss, decayed timber and fallen tree trunks that have lost out in their struggle to reach sunlight. Over all and beneath our big trees the brush is thick and many little trees are struggling for life. Then comes the timber faller, and the tops and limbs of our big fir, cedar and spruce are piled on the cover and help protect the ground, in the chopping, from the sun.

Many low grade and young trees and hemlock are left standing. An old chopping has a timber land appearance in some parts, for what we do is not to cut all but only that adapted to our present market. Our process is the selection of the fittest—the keynote of American forestry. Now keep out fire and we become true conservationists, for some day we will again return for the fittest and later for the best of the new crop and thus perpetuate our forests.

Those long familiar with western lumber conditions will remember the time when we had only a coastwise market, with an occasional foreign order, and no thought of ever shipping by rail. They will remember all coastwise cargoes were tallied and graded at destination and the grades were merchantable, refuse and firewood.

Firewood returned freight only; refuse returned freight and cost to saw; merchantable, which included all we now call select and most of the clear, brought freight, cost to saw and cost of the log. Any profit had to come from the little flooring we made or some special order.

When lumber could be had for such prices customers wanted only the best, so the dealers wanted only the best, and the mills wanted only the best logs, and the loggers could use only the best of the best trees. For such logs the mill paid four dollars to four dollars and fifty cents a thousand feet. Anything falling below their standard received four notches, which meant "Not

scaled but taken by the mill for full measure." To repeat, the buyer demanded the best and that the dealer must furnish or go to the wall. The logger must furnish what the mill wanted or go to the wall.

Up to 1897 fir logs had seldom sold for more than \$4.50 and stumpage had seldom been higher than 50 cents a thousand. The best quarter section of timber, under those conditions, cut less than 6,000,000 feet. Six million was the limit, as 12,000,000 to 14,000,000 is the limit to-day. We must then have left the other 6,000,000 to 8,000,000 in the old choppings; part in trees not up to grade, part in the hemlock and cedar not then wanted, part in high stumps, but mostly in long tops. Those days we took two logs out of many a tree which we would take four or five logs to-day, and those 40 feet long.

Had it occurred to you to ask what has become of the 6,000,000 to 8,000,000 feet we left behind on each quarter section? You all know of many old choppings where fire has followed fire, and where there is no living shrub, and hundreds of branchless stubs, telling by their unsightly skeletons what might have been had no fires reached them.

You also can recall, or find, if you will, old choppings where no fire has ever run. These you will have perhaps passed by as original forests, for such they look to be. But examine them more closely—hundreds of tall trees are standing, hemlocks perhaps in part, but none the less valuable twenty years from now. And beneath and between these taller trees is a thick growth of young fir, spruce, cedar and hemlock, of all ages, rank, thrifty, giving promise of more timber to each acre, thirty or forty years hence, than was produced by the original crop.

Now look again. Crawl through that jungle and you will find many a moss covered top of the fathers of this young forest, and that top will often be 40 or 50 inches in diameter and 150 feet long, for its father was cut when timber was cheap, and that condition means waste; that timber was cut when 6,000,000 was a large yield. The other 6,000,000 left

on the ground are in among that new growth.

We all know that many a fine fir or cedar log is taken from down timber that has lain in the woods for fifty years; so if sheltered, that is, kept moist, as in the forest, that 6,000,000 to 8,000,000, or most of it, is still in existence.

With brush, ferns, tops and vines to protect the ground until the new timber springs up we know the forest conditions of dampness and shade have been maintained, except for a year while nature has rearranged her costume, and then maintained in good part.

Go then to your cutover lands, when prices are high, for then low grades are in demand, and you will find that which you cut and left twenty years ago nature has placed in cold storage and trees you left standing will have increased in size and will look good, and you will say, "Great head! to leave those trees." You will also find a thick stand of young timber, the largest of which can be cut for lumber before another twenty years.

I will give you an illustration in approximate figures actually realized. Eighty acres of timber on tide water, cut in 1886 and logged with cattle, yielded less than 3,000,000 feet of \$4.50 logs, on which the stumpage returns totaled less than \$1,500. In 1906, just after the San Francisco disaster, the land was sold to a logger for a home, and one of the considerations was that he should hold all merchantable timber, for which he was to receive \$4.50 a thousand for logging. The land had never been burned and there was about 500,000 feet of standing timber not up to grade required twenty years ago. He hauled and delivered over 2,000,000 feet of logs, worth that year \$10 a thousand. No. 1 logs were selling for \$12. This left a stumpage of \$5.50, or net returns of \$11,000, against \$1,500 returns on first cutting. And still there were logs left in the woods that some day will be hauled, and there was a forest half grown.

Nature stands ready to repair the damage to her forests by tornado, flood or ax. She has on hand seed already sown, young plants already started, shade in reserve to keep moist the ground while her pets are growing, nutriment for their tender roots, birds and bees to fertilize, animals to dig among them and plant seeds, seeds on the tops of her fallen giants ready to perpetuate their species, and if allowed she places all, in the least time possible, in a condition of greatest safety from her old enemy, the fire. But thwart her efforts and apply the torch, and as a man disheartened takes to drink so nature turns to destroy that she sought to protect. It is her wish to hide away the tops and broken logs and down timber left, and if trusted she shades them and keeps them always moist, and even fifty years hence fir and cedar will be found but little the worse for their years. But thwarted in her efforts and fought by fire and man, she exposes all to wet and dry and most rapid decays. She also prepares all for more fire, and fire again, as the drunkard destroys his body and mind.

But suppose, when you go back for the 6,000,000 feet of logs you left on the "quarter" you logged twenty years ago, you find that it has been burned. If burned but once nature may have managed to save you something, but if burned once the chances are many to one that it has burned twice, and most likely many times, for when the first fire destroys nature's shade of leaves and ferns and fallen tops and young trees she leaves all naked to blister in the sun. Then all things dry to powder, and the second fire destroys seed and soil.

So if your claim proves to be one of the many burned, instead of a timber crop half grown and half a crop left in storage, you will find dead, topless, rotten stubs where you left standing trees — charred, burned and rotten brands where you left logs, and worthless land and baked clay where you left soil.

Did you burn that chopping, and if so, why? Did you think the trees

you left would never be wanted? Were you so thoughtless as to think worthless to-day always worthless? You could not have hoped to make pasture, for you must have known the soil would burn before those tops. You could not have thought it would protect you from fire in the dry season, for you know the second, not the first, is the fierce and dangerous fire—the one that comes after the leaves are gone and the sun has had a chance.

If you burned that claim the truth is you burned it because your father and grandfather did so, for the fire on our western slope has crossed the continent—never out when weather permitted. It has come to be a tradition among loggers that they must "burn or be burned," and beyond that they have not given the question thought. They fight brush and tops while logging the land, and it is with a quiet chuckle they apply a match and get even when the logs are off.

The first fire burns only the leaves and a few twigs that would have been food for the new forest; that and the young trees waiting for sunlight; that and some seeds on the fallen tops. But the second fire, often springing from smoldering roots, takes seed and soil and leaves all a desolate waste.

I gave you an illustration of a cutting where no fire had run. Two miles from that location there are four sections cut about the same time, and burned "when safe," as the loggers say. Purposely burned, think of it! Deliberately burned! A clear case of grand larceny, lacking only the law. An example of the lumberman's crime of the age. And to-day there is no living thing there and no soil. Fires deliberately set on those lands have destroyed what to-day would have been worth hundreds of thousands of dollars.

Had the first fire been kept out of all our choppings all fir and cedar timber left in the woods would still be preserved, and from this on, if the first fires are kept out of our choppings, what is not now wanted can be saved for future use, and the growth of our

young timber will yet furnish a large percent of future needs.

To those who say the first fires can't be kept out (and there are many) we answer the word "can't" and the phrase "can not" are obsolete and no longer admissible among Americans. Instead we substitute the phrase "Will it pay?" And again I answer, a man by night and a man by day on each corner of every section of old choppings for six months each year would leave a fine margin of profit and a new crop to spare.

Cut trails, increase the number of our fire wardens, give them motorcycles, build them watch towers, connect them by telephones, set mathematical instruments with which to define the location of the first whiff of smoke. Inspire the people with as healthy a dread of setting a fire in the country as they have of setting a fire in the city. Take the idea out of the lumbermen's heads that "it is only an old chopping." Many a lumberman has remarked this fall, "the fires did no great damage, they burned mostly in old choppings." Of the two never mind the green timber. If that burns it can be cut and sawed, but guard and protect the old choppings, nature's cold storage and nature's new nursery, where she is trying to replace man's depredations. And, first of all, stop railroad locomotives from emitting sparks. Nothing can be done that will save our timber until the railroads are prevented from burning their greatest source of future revenue. They are responsible for nearly all the forest fires to-day. Along their routes, go where you will, except oil is burned, you will find on each side only ashes and brands, and if there is anything left to burn and conditions are right you will see it spring into flames as you pass.

The object of this paper is to show the crime, not the remedy. Study the work New York is doing in the Adirondacks, and the results obtained by European methods, and the methods adopted by some of our other states, and take a fearful lesson from the shocking results of our methods as they show for themselves in Minnesota, Michigan and

Wisconsin, where hundreds of thousands of stubs that would to-day have been worth \$20 a thousand if standing, are all that is left of vegetation or of soil which once was fertile land and should to-day have a second crop ready for harvest, and that crop worth ten times the price received for the first.

The old argument of the western logger is "burn when safe for it will burn anyway and perhaps burn you." This, if applied to your house, would read, burn your house when it rains so it won't burn your neighbor, but burn it for it will burn anyway and perhaps you. But the logger's argument is not as good as the parallel, for the one burning of the chopping only prepares all for the second burning, which is more likely to occur than the first, and far more fierce. Your home once burned is removed from further danger of fire. To repeat, that which the first fire takes would all have been nutriment for the new timber crop in a year; that, and the young trees that were waiting for the sun; that, and the trees left standing ready to push ahead for early cutting; that, and the brush which would have in another year replaced its broken parts and held a sunshade over all; that, and the vines and ferns that would have helped keep all moist; that, and preparation for fires to burn the soil and all seed and bake the ground into a condition of utter impotence from which it can not recover in a generation. These things are all that the first fire does, nor does the second fire clear any land. I have known seven fires to

run over the same ground and to-day there is no living thing there except a growth of fire weed, ready to carry fire to the material still left, which is ample for more fierce flames.

Of all these forest fires the first is easiest to prevent. Brush, moss and the shade of the fallen tree tops keep the ground still moist. The dead soil and sun are ready to grow a shelter while the new forest springs up to give its perfect shade. Nature helps to keep out the first fire and in a few years places the old chopping in a condition as safe as her older forest areas.

The first fire is but the loss of the nail, in the old proverb, that caused the loss of the shoe, that caused the loss of the horse, that caused the loss of the rider. The moral is, replace the nail and, in forestry, keep out the first fire.

If the first fire had been kept out of the state of Washington the annual growth of the new timber crop would be fully the equal of the annual timber cut, and the land cut over in the 50's would to-day be ready to yield more feet an acre than did the original cutting.

When, therefore, we have found a practical method of preventing the first fire in our choppings, where the land is principally valuable for the timber crop, we shall have solved the great problem of timber conservation on the slope from the Cascades to the ocean. All else is detail. He who would leave to our children that which is theirs must keep out the first fire.





Veteran Sitka spruce in creek bottom near Ketchikan, Alaska

THE FORESTS OF ALASKA

By R. S. KELLOGG

(Abstract of United States Forest Service Bulletin, No. 81.)

MORE than one-third of Alaska's immense territory is yet but little explored. The permanent population at the present time is estimated at some 40,000 white and 25,000 natives; about half of the latter are Eskimo in the region adjacent to Bering Sea and the Arctic Ocean. The most important product is gold, of which the output in 1908 was valued at more than \$19,000,000. Fisheries rank second, and the salmon packed in 1908 had a value in excess of \$10,000,000.

Most of the internal improvements of Alaska have been made by the War Department. The telegraph system is constructed and operated by the Signal Corps, with offices at all important points. Transmission depends not only upon cable and land lines, but on high-power wireless stations as well. Roads are built chiefly by the corps of engineers of the War Department. Rail-

roads, except for short lines running out to a few mining camps, are utterly lacking, and the total railway mileage does not exceed 350. Alaska has 4,000 miles of navigable rivers; without them most of the present development would have been impossible.

On the coast of southeastern Alaska trees grow to large size; in the interior the timber is much smaller. The higher mountain areas are completely above the timber line.

The coast forests of southeastern and southern Alaska are nearly all included in the Tongass and Chugach national forests, which comprise 26,761,626 acres, and a large proportion of this area is forested.

In the coast region the stand is generally dense, and as much as 25,000 feet per acre has been estimated for considerable tracts. Sitka spruce probably



Looking across an Alaskan tundra towards Nome and Norton Sound. Small lakes and mining operations in middle distance

averages twenty per cent of the stand and western hemlock about seventy-five per cent. The spruce reaches a large size, and occasionally attains diameters of more than six feet and a height of 150 feet. Diameters of three to four feet are attained by western red cedar. While by far the most abundant species, western hemlock does not produce as large individual trees as the spruce or the cedar. The heavy rainfall causes an undergrowth of moss and brush which completely covers the surface except where it is too rocky or too steep.

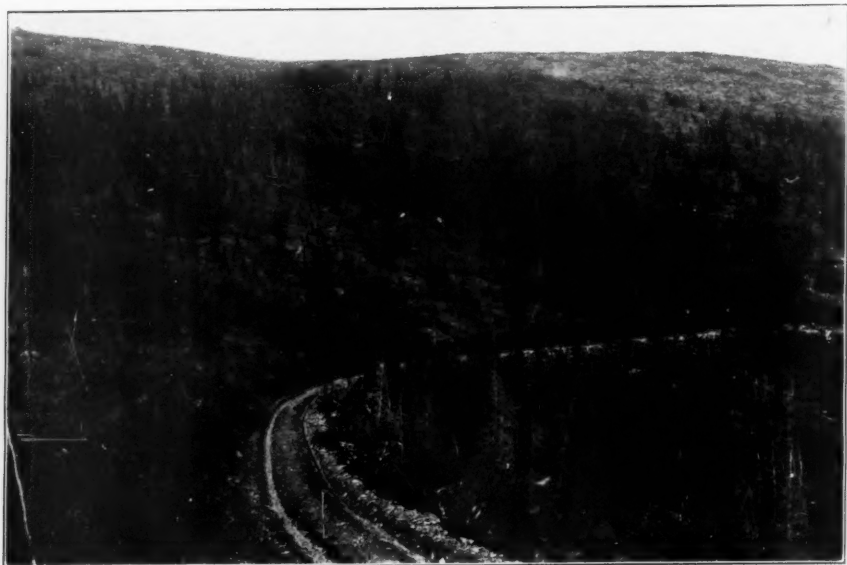
Practically the entire forest of the coast region is over-mature. It has been accumulating for ages, uninjured by fire or cutting. Shallow, rocky soil, steep mountain slopes, or poor drainage often prevent thrifty growth, and on such sites "stag-headedness" and decay are common. In favorable situations the rate of growth of the coast trees is fairly rapid.

The forests of interior Alaska are practically all included within the drainage basins of the Yukon and Kuskowim rivers. They are chiefly of the woodland type, and are estimated to cover approximately 80,000,000 acres, but probably not more than 40,000,000 acres bear timber of sufficient size and density to make it especially valuable for either cordwood or saw logs.

The white spruce is the most important, since it furnishes the only saw timber of the region, and is also much used for fuel. White birch is extremely abundant, as are also poplar and aspen,

in many localities. Black spruce is of general occurrence and abundant. Mixed forests of all species are common, though there are occasional pure stands of each species."

Obviously, all the forests of Alaska, whether on the coast or in the interior, should be protected and made of the utmost permanent use. The coast forests, which include most of the saw timber of the territory, and by far the heaviest stands, are nearly all protected by inclusion in national forests. They have not been damaged by fire, and are but slightly reduced by cutting. They are over-mature. Carefully planned cutting should take place as soon as possible. Every effort should be made to have them utilized for lumber, and especially for pulp. They should be so managed as to increase the stand of spruce and decrease that of hemlock. In the interior forests, situated entirely upon public lands, unregulated cutting and devastating fires are going on. The coast forests were reserved before they were impaired. Those of the interior have already been seriously damaged. Their protection cannot begin too soon. While the products of the coast forests need a foreign market, the interior forests with the best of treatment are not likely to supply more than a part of the home demand. If protected, they will continue to furnish logs for cabins, low-grade lumber, and fuel indefinitely. Higher grade lumber required by the interior must always be imported.



Upper limit of forest, Cleary, Alaska. Small black spruce, shrubby birch and willow, with grass above



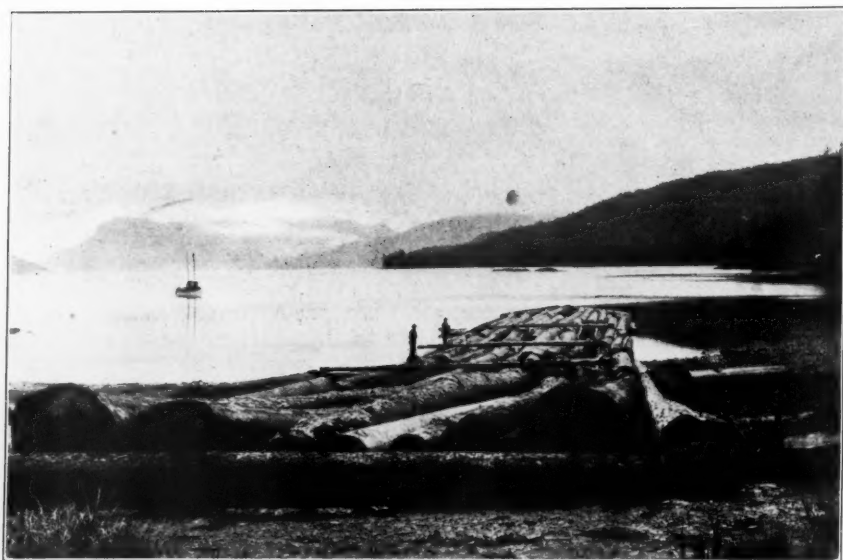
Typical Yukon River flat, Alaska. Forest of small white spruce with some balsam, poplar and willow, within the Arctic Circle



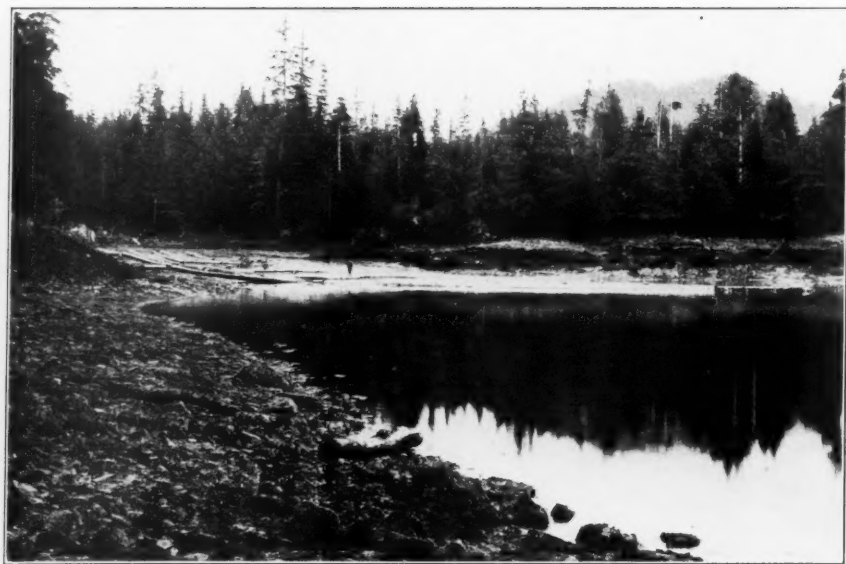
Typical aspen, with scattering birch and spruce at left. Buildings are at Fort Egbert.
Eagle, Alaska



Birch grove on the Fox-Fairbanks road, Fairbanks District, Alaska, cut over
and then swept by fire



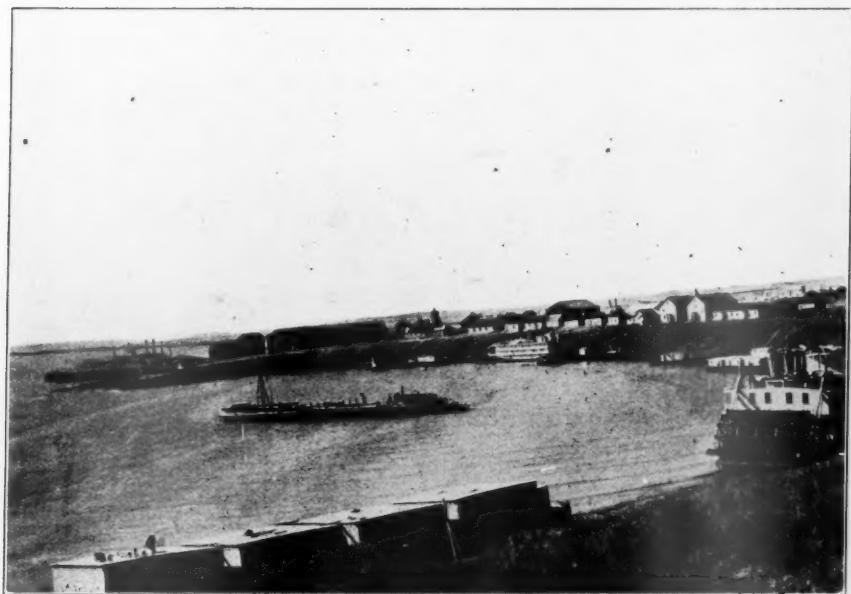
Raft of spruce logs, containing 190,000 feet log scale, in an inlet on Eastern Passage, near Point Madan, Wrangell, Alaska



Another view of raft and inlet on Eastern Passage, near Point Madan. Spruce, cedar, and hemlock timber on shore



View across Nome Hills, from top of King Mountain. Elevation of hill in the background 1,700 feet. Vegetation of the tundra type. Nome, Alaska.



Harbor and town of St. Michael, Alaska, the shipping point for Yukon River traffic

THE PROTECTION OF FORESTS FROM FIRE

By HENRY S. GRAVES

Forester, United States Department of Agriculture

Part II—Continued from November Number

Cleared fire lines are also used in extensive pine forests on dry, sandy land. Fires start easily and run swiftly under such conditions, and fire lines are easy to construct and comparatively cheap to maintain. Thus, in the pine forests of northern Germany and southern France, wide cleared lines are used to supplement the road systems.

The danger from fire is always very great in the regions of the Tropics that have a pronounced dry season. In India, for example, fire protection constitutes one of the greatest problems of management. The forest becomes very dry in the hot season, and there is a great abundance of grass, which ignites readily and carries fire swiftly. Under these conditions cleared fire lines are absolutely necessary for efficient protection.

The width of fire lines varies greatly under different conditions. In general the following classes from the standpoint of width may be recognized: Normal, from 6 to 15 feet; wide, from 15 to 30 feet; very wide, from 30 to 60 feet. In Europe fire lines are usually about 10 to 15 feet wide, but in the pine plains they are often as wide as 50 feet.

In this country such fire lines as have been constructed are usually less than one rod in width. In the chaparral of California, however, broad lines from 40 to 60 feet wide have given the best results in stopping fires.

It is seldom necessary or practicable to make fire lines over 60 feet wide. Usually it is more economical to make a number of narrow lines rather than a few very broad ones.

In constructing a fully cleared fire line the timber and brush should all be

removed or disposed of to the desired width. Where it is impossible to utilize the timber, the logs may be left along the side of the lines. The brush and other debris should be burned. Piling the brush along the edge of the line is a dangerous practice. As a rule, the best plan is to burn the brush in piles in the cleared area, and then burn the ground litter by a broadcast fire.

In the best permanent lines the stumps are all grubbed out and the soil is occasionally stirred by grubbing or harrowing. Sometimes only a part of the line is cleared to the soil. Thus, for example, the timber and brush may be cleared from a strip from 10 to 15 feet wide, and a narrow strip or trace about four feet wide ground-cleared. This cleared trace may be located in the middle of the line, or on one side. A good plan is to make two traces, one on each side of the fire line. The advantage of the last plan is that it affords a very good protection when burning the debris on the line.

The method of constructing a narrow, ground-cleared trace, covering only a part of the fire line, is very commonly used where there is a deep duff on the ground. It is then a question of protection against ground fires. Under such circumstances the trace is usually a trench. In the north woods the duff is frequently two feet deep. A narrow trench, from one to three feet wide to the mineral soil, suffices to stop or check a ground fire. The trees and brush are cleared for a width of from six to 15 feet, to facilitate work in fighting fire and in constructing and maintaining the trench.

Fully cleared fire lines should be cleaned off every year or two. The leaves and other *débris* accumulating upon them should be removed by burning or otherwise, and in the case of grubbed lines the soil should be stirred over by raking or harrowing.

The work of burning over the fire line can best be done in early spring. The leaves and other *débris* will become dry on the open fire line sooner than in the adjoining forest or chaparral. The aim should be to do the burning at exactly the time when there will be the least danger of the fire spreading to the woods. It is, however, not always possible to organize the crew so as to have the work done at the most favorable period. In the case of an extensive tract the work may be begun exactly on time, but the whole woods may become dangerously dry before it can be finished. It is especially difficult to carry out this work of burning over the fire line in open pine woods on dry, sandy soil.

When the burning has to be deferred until the woods as well as the fire line are dry, great care should be exercised in the work. If the ground cover consists of leaves or needles, the procedure is as follows:

Narrow, cleared traces are made on each side of the fire line proper by raking or brushing aside the leaves, or needles, and *débris*. Sometimes, in flat, level areas it is possible to make the trace by plowing one or two furrows. Usually these traces need be no more than a foot wide. A fire is set along the side of the fire-line. One or more men follow this up, constantly brushing the burning or smoldering embers toward the center of the fire line, the idea being to keep the fires confined between the traces. Other men follow behind and watch the burning area to prevent a possible spread of fire. If there is a strong wind, no burning should be done. If there is a slight wind across the line, one trace may suffice on the lee side, and the burning should proceed against the wind. Under ordinary circumstances a crew of from four to six men suffices for burning

over fire lines, but if the weather is very dry a much larger crew may be required.

In very dry weather the burning is best done early in the morning or in the late afternoon and evening. The air is moister and there is usually less wind at those times.

In California several interesting experiments in keeping down the brush on the broad lines are being tried. One is to pasture on the line a flock of goats, which eat down the new weeds and sprouts, and trample the ground. Another is to establish on the line a dense growth of succulent herbaceous plants, which would tend to keep out ordinary weeds and obviate annual or periodic grubbing.

The cost of constructing fully cleared fire lines varies enormously, just as does the construction of a road or trail. The cost of clearing the line depends upon the width, character, and quantity of timber and brush to be cut, the quantity of tops to be disposed of, and the character and quantity of ground *débris*, as well as the labor, the difficulties of work, the efficiency of organization, etc. If the ground is grubbed, the cost is affected by the character of the work done, the difficulties of working the ground, and the topography. In general, the fire construction of an 8-foot fully cleared line costs anywhere from \$10 to \$100 per mile. An average for a second-growth woodlot would be from \$30 to \$50. If there is a good market for cord-wood and other material, the timber might return 50 or 60 per cent. of the whole cost. The wide fire lines in southern California cost from \$100 to \$200 per mile. They are now cleared every two years at a cost of from \$50 to \$75 a mile, and the cost of maintenance will be progressively smaller from year to year.

Tree-cleared Lines

By a tree-cleared line is meant one from which the trees and brush are removed, but from which no effort is made to clear the leaves or other small

litter. The object of such lines is not to stop a fire, but to furnish a vantage ground for patrol and for fighting fires. The brushing out of all wood roads, already mentioned, makes the best kind of tree-cleared lines.

Very frequently special tree-cleared lines are made where there are no roads or trails, as, for example, along the boundary of a tract, about a recent clearing around a body of young timber, etc. In Europe such lines are often made between two compartments where there is no road or other permanent boundary.

The width of tree-cleared lines is usually from 6 to 15 feet. The European tree-cleared lines between compartments are usually about 6 to 8 feet. Often a line from 10 to 15 feet is cut, especially where a road may later be located. In a number of instances in this country very wide lines have been cut, 75 or 100 feet in width. Such great width is ordinarily unnecessary. Strips a rod wide are usually of fully as great value as the very wide lines, except in conifers, where there is danger of crown fires. The maintenance of these lines consists in brushing them out every year or two.

Ground-cleared Lines

By ground-cleared lines are meant strips on which the small brush and ground debris are destroyed, and the larger trees are left standing. Ground-cleared lines may be made in open woods, where there is little or no undergrowth to be injured or to interfere with the work of clearing the ground. The usual procedure is to burn a strip through the woods from 10 to 20 feet wide. This can be done only where the conditions are such that a surface fire may be controlled and restricted to the desired strip.

The open pine woods of the South present an ideal condition for the use of ground-cleared lines. In burning the lines practically the same methods as those described for burning over regular fire lines should be used.

Location of Fire Lines

The existing roads usually constitute the base or framework of a system of fire lines. Ordinary roads, old wood roads, skidding trails, and other open strips are used first, and special lines are constructed only when necessary. Special lines should always be located at the strategic points.

In any given forest the boundaries should first be protected. There must be protection from fires that may start on a neighboring tract. Often roads running along or near the boundary will give adequate protection. If not, and there is danger of fire entering from the outside, a fire line is desirable, even if it is only a tree-cleared strip.

Fire lines are often constructed around recent cuttings, where there is young growth established or on areas where there is still considerable slash.

One of the places where fire lines are most needed is along railroads. It is the custom of certain railroads to keep their rights of way clear, usually by annual burning. In some states this is required by law. In spite of this precaution, innumerable fires are set on the right of way, and very commonly by sparks thrown into the woods beyond.

Many special fire lines have been tried. In general, these are based on the principle that the right of way should be cleared, then a strip of woods left standing, and then a second cleared fire line constructed back of this strip of timber. The theory is that the trees on the timbered strip will catch the sparks thrown beyond the right of way. Any fire set by these sparks on the timbered strip will be stopped by the second fire line.

This principle has been used in a number of instances in this country. One good example is found in a hardwood forest in southern New York. A railroad runs through the tract, along a stream valley. The stream acts as a fire line on the low side of the railroad, but the opposite side is exposed to frequent fires resulting from the sparks

escaping from locomotives. A stretch of several miles is on a steep grade, and the locomotives under forced draft, throw out great showers of burning cinders, and no spark arresters whatever are used. As a protection, a fire line varying in width from 8 to 15 feet has been constructed on a bench at a distance of from 50 to 150 feet from the railroad. (Pl. IX, fig. 1.) The strip between the line and the railroad is left untouched. A patrolman rides over the strip about the time the trains going up grade pass by. Ordinarily the small fires are extinguished by beating. In case, however, a number of fires are started by a train, as often happens, one or two of them burn over the strip to the fire line before the patrolman can reach them. The strip is so narrow, however, that they gain little headway, and are absolutely stopped by the fire line.

In mountainous country, fire lines are located with reference to the topography. Where roads are used, or fire lines are made that are intended to be used later as roads, the location is governed largely by the principles of road construction. Special fire lines, however, constructed for protection alone, are built mainly on the crest of ridges. (Pl. VIII, fig. 2.) Thus, the wide lines in southern California, already mentioned, are on the various ridges. A fire runs up a slope very rapidly and works over a ridge slowly. If there is a wide, cleared fire line on the ridge the fire may be stopped entirely by it alone. In the southern Appalachians and other mountains, the old mountain trails on the ridges may be developed into admirable fire lines.

The question of when and where to construct special fire lines depends on local conditions, the danger from fire, the value of the forest, the organization of patrol and force available for fighting fire, the object of the owner in protecting the forest, and many other factors. As with other operations of management, the expense must be justified by the results which their construction is intended to accomplish.

Artificial Fire Obstructions

It is well known that a small, creeping surface fire is stopped or checked by a stone wall or other similar obstruction. This principle may be used in fire protection, and other types of fire lines may often be dispensed with where there are such obstructions. A well-known railroad has been experimenting with a specially constructed fire wall.

SUPERVISION AND CONTROL

A careful supervision or patrol during the dry season is one of the most important measures in organized fire protection. Its purposes are: (1) To prevent fires from starting; (2) to detect fires as soon as possible after they start; (3) to fight fires.

The mere fact that a tract is carefully watched makes it safer, because campers, hunters, and others crossing it are less careless on that account. By an efficient supervision most of the unnecessary fires can be prevented, such as those arising from carelessness in clearing land, leaving camp fires, and smoking; from improperly equipped sawmills, locomotives, donkey engines, etc.

One of the fundamental principles in fire protection is to detect and attack fires in their incipency. In an unwatched forest a fire may burn for a long time and gain great headway before being discovered. In a forest under proper protection there is some one man or corps of men responsible for detecting fires and for attacking them before they have time to do much damage or to develop beyond control.

Aids to Supervision and Control

Under the head of aids to supervision and patrol are included: (1) The posting of fire warnings; (2) lookout stations; (3) telephone systems; (4) signal systems.

Posting of Fire Notices

One of the first steps in organizing protection in a forest is to post it with fire warnings. These notices emphati-

cally warn against carelessness in the use of fire, and often give instructions how to construct camp fires and how to extinguish them when breaking camp. They usually contain also the prescribed penalties for infringement of the fire laws. Notices are posted at frequent intervals along roads and trails, at camping grounds, near permanent camps and settlements, and in many cases along the boundaries of tracts. On private tracts the fire warning is combined with the trespass notice.

In the National Forests fire-warning notices are printed in English, Italian, French, and Spanish. Notices printed in Italian are posted where Italians are employed in the railroad construction or section work. Spanish notices are used in New Mexico, southern Arizona, or other localities where there are many Spanish-speaking people. Near the Northern boundary French notices are sometimes used. Beyond question many forest fires have been prevented by these warnings.

In the case of a forest owned by a nonresident it is a good plan to have on the notice the name of the responsible local agent, as well as the owner's name. This lends emphasis to the fact that there is a local man who is looking after the property.

Lookout Stations

Lookout stations include watch towers, mountain lookouts, and other elevated stations used for overlooking tracts and watching for fires. On small tracts they consist usually of some simple structure which enables the person responsible for the property to overlook the forest to see if there are any fires, and, in case he sees smoke, to locate the fire. Sometimes an arrangement on the roof of the house or barn serves as a watch tower, or a lookout may be built in a tall tree, or it may be necessary to build a rough tower to see over the tree tops. In a rugged country it is usually possible to find some convenient peak from which a large area can be looked over. (See Pl. I.)

In the organization of large tracts in mountain regions special lookout stations are sometimes provided. These are located at high points from which a large area of the forest can be seen. A man is kept constantly at each station during the dry season. The various stations should be in communication by telephone or telegraph, or by some system of signals. Each is provided with range-finders or other equipment, by means of which any fires that may occur can be precisely located. They are also in communication with the forest ranger or superintendent at headquarters, so that a force of men may be called at once to the fire and put it out. In extensive mountain regions these lookout stations constitute an important part of organized fire supervision. They have been successfully operated in the National Forests.

Telephone System

One of the great difficulties in extensive forest districts is to secure the necessary help in fighting fires. The telephone is the greatest aid in fire patrol. It enables the man who discovers a fire to call for help and to give directions as to the number of men and the equipment needed. By the use of the telephone in the National Forests millions of dollars have doubtless already been saved. The Forest Service has since 1906 built 4,850 miles of telephone line, and it is extending the lines as rapidly as Congress furnishes the funds for the work.

Signal Systems

When there is no telephone system and a regular lookout station is not feasible, a special system is used for signaling for help in fighting fire. Some prominent peak is selected, from which, in case of fire, the location and size of the fire and the required help are signaled by a prearranged code. There are various systems of signals in use. The fire signal is one of the oldest methods. At a time when the signals are not needed small piles of wood, brush, or other inflammable material

are gathered and placed in position at about equal distances, usually about 50 to 100 feet apart, ready for firing on short notice. The number of fires burning at the same time conveys the information required. Thus, one fire might mean that a forest peak is burning in a certain locality on one side of the mountain; two, in another locality; three, in another; and so on.

Another system that is sometimes employed is the smoke signal. This was once very commonly used by the Indians in communicating with each other from one distant peak to another. A small fire is built, and after it gets under headway, damp moss or earth is used to deaden it and develop a heavy smoke. A blanket or other covering is thrown over the top of it to smother the smoke down for a few moments. The blanket is then raised, and a dense puff of smoke is released. The blanket is again thrown over the fire to check the smoke for a moment, then it is again removed, and another puff of smoke ascends. This system also requires a prearranged code. The smoke signal may be used in the same manner as the fire signal, by causing two or three separated columns of smoke from dampened fires to be steadily rising at the same time. This system of signaling may be used to good advantage on a still day for communicating long distances. The separated fire signal on top of prominent peaks can be used in the night as well as in the day.

The heliograph is an instrument which may be used for flashing signals from the lookout stations. The Forest Service has recently conducted successful experiments with this instrument.

Another system sometimes used when the wind is blowing and the sun is shining is a windmill signal. A small windmill is set up on some conspicuous elevation. This is provided with a small belt and pulley connecting with a revolving ball or wheel in which small mirrors are set at different angles. In case a fire starts and the wind is blowing, the watchman simply connects up his windmill with the ball in which the mirrors are set, and goes on to the fire,

leaving his automatic signal to flash to the settlement the news of the fire and the fact that assistance is wanted.

In some cases it might be possible to use flags and the code of the Army Signal Corps. Near settlements the fire bell, gong, or whistle is commonly used to bring together the men for fighting fires.

The organization of an efficient patrol varies under the following conditions: (1) Size of tract; (2) character of the forest; (3) condition of the forest with reference to the amount of inflammable material; (4) difficulties of communication; (5) difficulties of securing help in fighting fires; (6) the topography with reference to the amount of territory which can be overlooked; (7) special sources of fire, such as the presence of a railroad; (8) local sentiment.

Supervision of Small Tracts

The supervision of a woodlot attached to a farm is exceedingly simple. If a farmer himself uses proper care in starting fires, in clearing out his roads, in disposing of brush, and in keeping a careful watch for fires, his woodlot is comparatively safe. Many woodlot fires are caused by the owner's own carelessness in clearing land, destroying brush, burning meadows, etc. The fact that the owner is careful in the matter of fires becomes known very quickly in the neighborhood, and that fact in itself is a great protection. It is not necessary for a farmer to patrol his woodlot at regular intervals, as would be necessary in the case of a large tract.

Many fires start on the property of nonresident owners, who themselves are unable to supervise it on the ground. Nonresidents may secure protection by an arrangement with some farmer living near the forest. The usual course is to pay a small retaining fee for general supervision, with the understanding that the farmer goes over the tract every few days, thus giving the impression of constant patrol. In case fire starts, the agent has the responsibility of repairing to the fire and putting it

out and employing such help as is necessary. There is no reason why this plan should not provide adequate protection for tracts of from 100 to 500 acres at an annual cost of from three to five cents an acre.

One of the most essential measures in the protection of small tracts is to secure the cooperation of the owners of all the neighboring tracts in watching for fires and in mutual assistance in extinguishing fires, no matter on whose land they may start.

Supervision of Large Tracts

In the protection of large tracts from fire a special organization for patrol is necessary. This organization can best be combined with that required for the management of the tract. In every forest that is being developed there is necessary a certain force to supervise any work such as logging, the construction of roads, the protection of game, the prevention of trespass, etc. This organization is best illustrated in the National Forests. There is a permanent corps of trained rangers who live on the Forest, each in charge of a specified area. These men have executive charge of all the work in the woods. During the dry season this force may be supplemented by temporary forest guards for special fire patrol. Each guard is assigned to a specified part of the Forest, which he is required to patrol regularly; he prevents the start of fires as far as possible and watches for any fires which may start within his range. It has already been explained that one of the purposes of the construction of trails through the Forests is to enable constant patrol and access to fires which may be started. The guards ride or walk over these trails under a systematic plan. There is usually a regular beat over which the guard travels at regular intervals. In some tracts it is possible to go over the beat once a day; in others it requires a much longer period. When not on patrol the guards are engaged in the general work on the Forest.

In the plan of control the guards keep in close touch with each other and with the ranger in charge of the whole work in order that they may communicate in case of fire by signal from outlook stations, by telephone, or any other method of communication that may be established in the Forest.

Most of the National Forests of the West are in rugged mountain regions, with comparatively few roads and trails. The guards usually travel on horseback over certain roads or trails, keeping track of the people who enter the Forest, and giving them special warning regarding carelessness with fire. In this way each person entering the Forest is impressed with the fact that his movements are watched, and the result is that he is more careful with camp fires, smoking, etc.

On large tracts patrol is concentrated at critical points. The guards spend most of the time where there is the greatest travel, frequently inspecting camp grounds, sawmills, and other points where fires are most likely to start.

In some instances the actual patrol over trails is more or less dispensed with, and men are kept continuously at lookout stations, from which a large area can be overlooked. In case of fire, signals are sent to other lookout stations and to headquarters, with the necessary instruction regarding the location of the fire, the number of men needed to fight it, etc.

It is impossible to give a specific rule regarding the number of men required to protect tracts of different sizes. There is no question that the National Forests are very much undermanned. In some cases a single man has the responsibility of protecting more than 100,000 acres. This area is much too large even under the most favorable conditions, and it is only through the most efficient work that the damage by fires has been kept down to 1.86 per cent. of the forest area. Even with the proper facilities for communication, the fire protection force on the National Forests should be quadrupled. Very good results would be obtained if

there were, during the dry season, one guard for each 20,000 or 25,000 acres. This will follow naturally as the increased receipts from the Forests justify a more intensive management.

In flat regions more men are required for patrol than in rugged country, where large areas may be overlooked from prominent elevations. It has been the general view that in flat regions like the Lake States and the plateau portions of Maine and the Adirondacks there should be at least one guard for each 10,000 acres.

The required force of guards is governed by the risk of fire and the value of the property to be protected. In the case of a forest of very great value there is necessarily a correspondingly greater justification for expenditure in fire protection, just as one takes out fire insurance in proportion to the value of his property. As the value of our forests increases, there will be a correspondingly greater amount of money spent on protection. This principle is illustrated in Europe, where the forests are very valuable and where frequently there is one forest guard for each 1,000 acres. (Prussia, one for 1,700 acres; Baden, one for 750 acres.)

Patrol Along Railroads

Railroads in many cases are the most prolific source of fires. In some sections over 50 per cent. of the fires are from the sparks from locomotives. While most of these fires could be prevented if the railroads used proper appliances on the locomotives for arresting the sparks, nevertheless, in many cases, it is probably impossible to prevent sparks which will start fires in very dry weather. It is, therefore, necessary to supplement the use of spark arresters by patrolling the right of way.

The most effective method of patrol is to follow every train with a speeder equipped with mattocks, shovels, pails, and other necessary equipment for fighting fires. A fire started by a spark from a locomotive may be put out before it has an opportunity to gain any considerable headway or to do much damage.

It is not always practicable to follow every train a long distance, and it may happen that there is danger from the sparks only at steep grades. In that event the patrol is concentrated at the dangerous points.

The plan of following every train by patrolmen may be practical where the distance traversed by the road is not great, but it would not be feasible for a great mileage. Thus, for example, the problem of patrol is being considered by certain large railroads with the view of applying it over the entire system, wherever there is danger from fires. The purpose is to save the annual expense of fire damages. Thus, one system in the northeast, covering not over 2,000 miles, is said to have an annual expense of \$50,000 for forest-fire claims. It is probable that the most practicable method of supervision of the right of way would be through the organization of section men, with a special patrol at certain grades where the danger from fires is particularly great. There is no reason why the section men, if provided with proper speeders and other equipment, should not be trained to repair at once to fires which may start along the right of way and put them out, with comparatively small loss of time.

In Minnesota the law requires that railroad companies must put on patrolmen to patrol their tracks. The forest commissioner may compel the companies to put on as many as one man to each mile of track.

(To be concluded in January.)



ROBERT PERKINS BASS

Governor-elect of New Hampshire

By PHILIP W. AYRES,

Forester of the Society for the Protection of New Hampshire Forests

ROBERT PERKINS BASS, who has just been elected triumphantly Governor of New Hampshire, deserves the honor. While serving two terms in the State legislature as representative and one as senator, he secured the passage of a number of important bills, including the forestry bill that has transformed the forest service of the State. His most important legislative achievement is the passage of the new primary law, by which the State has rid itself of political conventions and of the domination, through them, that corporate interests, particularly the railroads, had obtained. Popular approval of the primary system was clearly expressed in the primary elections held a month ago, and the final elections on November 8 gave Mr. Bass a larger support than has been given to any governor in recent years. He led the movement that abolished the granting of free passes by the railroad companies. He secured also a bill equalizing the taxes of the State, by which the corporations paid last year an increased tax of more than \$300,000.

Prior to these successful efforts in reform, Mr. Bass accomplished a heroic task in changing the old forestry commission, a political body, into one of the most progressive and useful commissions to be found in the country. It is his work in the cause of forestry that chiefly concerns this article.

Mr. Bass was born in Chicago, September 1, 1873, and is a graduate of Harvard College and Law School. His family came to New Hampshire from Chicago some years ago, as summer residents, and acquired a large tract of

land near Peterboro. In managing his own woodlands, thinning the old stands and planting new ones, he soon became a permanent resident. Mr. Gifford Pinchot and Mr. Henry S. Graves, then director of the Yale Forest School, are his personal friends. Through their suggestion a government experiment station was established on his property, by which thinnings of various kinds were made and recorded on definite areas for observation during a period of years.

It may be said that Mr. Edward N. Pierson, secretary of State in New Hampshire, discovered Mr. Bass in the state, because it was he who invited Mr. Bass to become a member of the State Forestry Commission, which was Mr. Bass' first public office. As a member of this body, he was for a long time in a hopeless minority, but wisely abided his time. Later, with the appointment of Mr. Robert E. Faulkner, of Keene, upon the commission, the two were able to secure control of the body. They promptly brought a bill into the legislature abolishing the old bi-partisan board. A new commission was created of which Mr. Bass was naturally appointed chairman. The same bill reorganized the forest fire service of the State and provided for a State Forester.

The new forestry commission having other able members and a trained man as State Forester, has made a distinct record in New Hampshire. Fire wardens have been appointed throughout the State. Private contributions have been secured by which thirteen stations have been located on the tops of mountains, connected by telephone with the

fire wardens, for the discovery and control of incipient fires before they become conflagrations. The beginnings of a state nursery have been privately established, by which seedling forest trees will be distributed at cost for experimental purposes to the owners of waste lands. It is confidently hoped that the forthcoming state legislature will adopt both the fire stations and the nursery. Mr. Bass has been keenly interested in

the success of the Society for Protection of New Hampshire Forests and for two years has served upon its executive committee. Last January he accepted membership in the board of directors of the American Forestry Association.

With Mr. Bass as governor, and with the present favorable sentiment throughout the State in favor of forestry, a wide opportunity is now open for progressive work in the State.

CONSERVATION

By C. S. HARRISON

President of the Nebraska Park and Forestry Association

(An address delivered at the summer meeting of the Nebraska Horticultural Society)

WHEN the Creator turned this great land over to us it was a region of surpassing beauty. For long millenniums He was at work, employing the highest art and skill for its adornment. The whole country was landscaped on a most magnificent scale and with a far-reaching forethought for the future. Everything was provided for. It was the patient work of ages to spread a thin layer of soil over the rocks and on the hills and mountain sides, and then fasten it there with trees, shrubs, and grasses. Mighty rivers flowed to the sea, fed by thousands of streams which sang merrily on their way. These streams were carefully protected. Forests, bushes, and rank vegetation prevented the washing of the soil, while at the sources of all these rivulets there was the most careful planning to retain the waters. Dead leaves, decaying trees, mosses and the accumulated deposits of the ages all were like vast sponges to retain the waters so that the streams would have an even flow. Mighty forests were planted. They grew and decayed. And so, as the centuries passed, the land grew richer and richer.

How artistically all was arranged! There were often delightful parks in the forests, and when the woods edged upon the prairies there were tall trees

in the background, shrubs to the front, then the flower-sprinkled carpet of green.

Go into the forests, the great temples of God. What massive columns upheld the dark green canopy. Look where you would, in woodland, plain, and mountain, the ages of the past had made preparations for the ages to come.

Then came the two brothers, Graft and Greed, with no thought or care for the future, with no appreciation whatever of the plans of the Creator. And a careless government, which to-day, from its own natural resources, could have had income enough for current expenses, allowed billions to be taken and destroyed. One of the most beautiful sights on earth is a splendid forest. One of the saddest spectacles is to see that same forest the prey of the destructive ax and fire—blackened stumps, like the gravestones of departed grandeur. If the lumberman had planned for the most speedy and utter ruin, he could not have prepared a more complete system. He took only half of the tree and left the rest to dry for the great tinder box. The fires came. All that dead rubbish was ready for them. Not only was the dead brush burned, but the age-long deposit of dead leaves, rotten logs, and rich mould needed to feed the soil for the coming eons; all were destroyed, and a garden of Eden

became a blackened wilderness. How the ruin has spread! Within the memory of man the mighty forests of Indiana and Ohio were chopped down and burned. If left till to-day, they would be worth more than all the crops grown there since their destruction. Take Arizona, for instance. The forests have been cut from the mountains. The rubbish invites the fires, and the fires never miss an invitation. Great flocks and herds of sheep and cattle were driven in, and they have destroyed the herbage which fastened the thin layer of earth to the rocks. The floods came and ripped the earth from the mountain sides and whirled avalanches of mud into the fertile valleys, often plowing out great gullies twenty and thirty feet deep through the rich soil, and all hurried on to fill the river beds. Now, when the floods come, there is nothing to detain them, and the people of Texas must suffer from the vandalism of Arizona.

There are no richer lands on earth than the great prairies of the west, and here in God's richest garden there have been two sources of disaster. The first is cropping lands without remuneration; raising wheat year after year with no manure, till some of the richest farms of Minnesota are now so reduced they will hardly raise chicken feed. This system of waste applies to rich, level lands. There is a double system applied to hillside lands—robbing the soil and allowing it to wash. I have known the richest soil to be swept away by a single heavy rain, so the whole furrow would be gone, and you could see the plow marks. Stand by any of our streams after a heavy rain and you will see the very cream of our fields going to the Gulf of Mexico.

It is waste, waste, everywhere. Most feeders will have their feed lots perched on some steep hillside, if they can find such a place, so that the richest fertilizer the world produces can be utterly swept away without any trouble on their part, and they keep on growing twenty-five bushels of corn to the acre, when, by saving the manure and plowing their land deep, they might have 100 bushels.

Our coal lands with their marvelous deposits, have been well-nigh given away. I have seen veins of coal eleven feet deep which the wise United States government sold for \$10 per acre. Streams with waterfalls that were gold mines have been parted with for a song.

Go into Colorado, and vandalism is there. The mountains are robbed of their beauty. The upland pastures are over-grazed, and you have desolation instead of beauty. A pioneer in the Rockies once said to me: "I think we early settlers should have great credit for coming in here and starting things." I replied: "If you never had seen this country, and had left it to-day as God made it, it would be worth five times as much as it is now."

Our railroads are great civilizers, but the fires set by the engines leave a track of barbarism behind them. See how it is in Washington and Oregon. The lumber barons who have wrought such ruin at the north are now at work among the grandest forests ever grown. They seem to concentrate all their energies there to complete the work of ruin. In some instances, every device is resorted to to get possession of lands which belong to the people. Take the Appalachian Mountains. The forests are being cut down; the beautiful rivers are filled with rubbish; sand and stones are carried onto fertile valley farms. In a short time, eighteen millions of damage was inflicted, and yet Congress looks on in indifference while the horror grows.

When you come to the farm, you see also a terrific waste there. In the east the soil is washed away and the rocks and stones are left; no thought or care is taken to save the soil. Many beautiful regions where heavy crops were grown are now deserted, and you can buy farms for half what the buildings would cost.

What wonder, in the midst of all this ruin, that a "Great Heart" should arise? He looks on the past, and then on the present, and then into the future, and he asks himself what will become of

this nation 200 years from now. In the ordering of Providence, when a tremendous crisis comes there is always a man to meet it. This time it was Gifford Pinchot, by education one of the best foresters the world has produced. A man of means, he is not hampered in his work. He is ready to sacrifice thousands for the future. He might have made judicious investments in the great west he knew so well, so he could have become a billionaire. He might have taken his chances in an unguarded moment and captured forests, water powers, and coal lands. No man since the days of Robert Morris, who furnished the sinews of war for Washington and then died in a debtors' prison, has done more or made greater sacrifices than Mr. Pinchot. Though for the present he has lost his position, he is yet a king, independent of throne or crown. Few men have shown such a fearless persistence in the face of the most determined opposition. There were thousands of men who had pet plans for the future. They wished to put their hands on the nation's wealth. Little cared they for the future. Cattle men and sheep men, who for years had been allowed to ruin young forests and destroy pastures by over-grazing, rose in arms. And what a clamor they raised!

There were no ways of fighting fires. The cattle men wanted fires. Some of the cowboys had it worked down to a fine art. Here was a tract they wanted burned. They might be caught. One takes a magnifying glass and sets it so the focused rays next day would light on dry leaves and other combustibles. The sun does its work, and the innocent cowboy proves an alibi, for he is fifty miles away. I met a range rider in the Rockies and had a long talk with him. He would say to stock owners: "You can put only so many head on this range, and you must pay for it." "Not much," was the answer. "We have had this range, and we are going to have it." He would tell them: "I represent the United States government. You cannot afford to have a war with 90,000,000 people." Often his life was

threatened. All manner of trumped-up charges were sent on to Washington, and sometimes he had to face fire both front and rear. But those heroic men, like the mounted police of Canada, have convinced the ranchmen there is a law in the land, and it must be obeyed.

In a terrible time like this, when most of our northwestern forests are tinder-boxes, what could be done without our range riders and their system of fighting fires? Sometimes they are at it for forty-eight hours without a let-up. One man found two of them lying on the ground in the deep sleep of utter exhaustion. They lay as they had fallen, and the ants were running over them. Perhaps these men take a little relaxation, and then the cry goes up: "See those lazy fellows, and the waste in the Forest Service." No figuring, you understand, of the waste of the fires and the ax. All manner of abuse was heaped on the chief forester, but there was a vision before him, a vision of ruin and desolation, and he wrote, talked, and pleaded, till the tide turned and a great victory was won. A crisis came, and issues involving hundreds of millions. The forester broke a piece of red tape, and he must go. No matter that he stands for a great principle. No matter that he has given his means and his life to a great cause. "Just look at that piece of red tape! Can't you see it is broken?" But, thank God, the nation is fully aroused and our forestry system is established.

You can readily see the clashing of interests. Leading men in our Pacific coast cities want the bars thrown down. The future may care for itself. They want the coal to be dug, and the water powers to be exploited, and flocks and herds to have free range. It all makes business, and they want business now. There never yet was a national park laid out or a national forest made but what there was a tremendous protest from this source. When the government made a national forest near Cass Lake, Minn., a howl long and deep went up. When we tried to have a park in the Wet Mountain Valley, and could have got a bill through Congress for

one of the sublimest resorts, Colorado congressmen sat down on it. But slowly and surely, the people are going to rule. This country is going to be saved. Not only conserved, but made more beautiful and attractive.

The rich soil of Nebraska is hungry for trees. In '72 there was not a shrub or tree on the townsite of York. Now it is called the forest city. We have single trees that would make over 1,000 feet of lumber. Timber pays. In scores of instances men have cut \$300 worth of cottonwood lumber per acre, besides the firewood which was enough to cover the cost. The land was left all the better because it was subsoiled by those vigorous roots.

The side hills must and will be defended from erosion and washing. You see farms with deep gullies ploughed through the cornfield; too deep, almost, to get a team across. Sometimes a grain of sense will come to the owner and he will dump in a load of straw, and so stop the wash. One year ago we had a fearful dust storm in the spring, and in some cases entire furrows on the hills were blown away. In one instance the rich soil of a neighbor drifted three feet deep on one of my hedges. I told him I wished he would lariat his farm and keep it at home. Groves and windbreaks are needed to stop the fierce gales which for ages have swept over our prairies. Buffer-crops can be sown on the long, sloping side hills. I once saw in the Republican Valley a large field of alfalfa which was catching the wash from the long slopes above it. The time will come when instead of the man moving his barn to get it away from the manure pile, he will get a spreader and put it on his farm. The man who feeds cattle will learn sooner or later that corn that is fed manure is worth a small gold mine, and that it will pay to save.

People are waking up to their possibilities. The boys of the future are

going to show their fathers how things will be done and that farming will pay. Two boys in North Carolina raised 125 bushels of corn per acre, where their neighbors were raising twelve. A boy near West Point, last year, raised 114 bushels, where the neighboring men were getting forty. Never yet has an acre of rich land west of the Missouri River been put to its best. The possibilities of our state are astounding. The time will come sooner or later when more will be raised on forty acres than the present system gets from 100.

The roots of corn have been known to go down six feet where they had a chance, yet you see men ploughing three inches deep for corn. The side hills will not always be planted to corn, which gives such a chance for washing. They will be planted to trees, which will be mulched with straw, or else sown to grass, which will be well manured.

The strangest thing is that men will not plant trees. There are millions of acres that are sometimes subject to overflow which for thirty years have raised nothing but weeds and which might be put to raising houses, barns, and wood-piles. Better restore the old woodshed, and raise your own fuel, and give the coal barons the go-by. A farm is an empire in itself. If the farmer raises everything he needs he will grow rich. The nation whose imports exceed the exports is growing poor. For the last few years the balance of trade has been in our favor. The past year we were about \$150,000,000 short, and if this keeps up we shall have trouble. The farmer who buys more than he sells will soon raise a big crop of mortgages. True conservation makes us work the land to advantage and save it as one of God's best gifts to man. So stand up for Nebraska and make it one of the most brilliant stars in our national constellation.



THE CABINET WOODS OF THE FUTURE

By C. D. MELL, Assistant Dendrologist. Forest Service

WHERE shall we look for new cabinet woods? This is an inquiry very frequently made by those concerned in wood using industries. Comparatively few of the foreign woods now in common use are of recent introduction. A number of the important and well-known cabinet timbers have been so extensively exploited that they are becoming scarce or are difficult of access. The cost of felling, transporting, and other handling is so high that it greatly militates against their use. Among such woods are mahogany, cedar, rosewood, ebony, padouk, sabicu, jarrah of West Australia, and scores of others which are less familiar. These woods are so closely associated with certain special uses that manufacturers are exceedingly reluctant to substitute other woods for fear that customers would regard them as inferior. Importers are attempting to bring into prominence some of the excellent cabinet timbers of India, Africa, Australia, Philippine Islands, and Central and South America, for there are many in these countries that are equal both in beauty and in quality to the best now in use. For example, a great many South American trees yield timbers with remarkable firmness of texture, exquisite coloration, durability, and good weight. The same can be said of many West Indian and Central American woods not yet exploited to any great extent. Among the several hundred timber trees of Costa Rica, San Salvador, and Panama, there are at least forty that yield high-class cabinet woods.

A few of the well-known and highly esteemed sorts, like the sabicu of the West Indies and sapodilla and Spanish cedar of Mexico and Central America,

are now becoming rapidly exhausted, and the prices are consequently high. In certain parts of these countries, there are trees yielding timber that can be substituted and utilized to equal advantage. Lower priced woods are often equally well suited for certain special purposes for which some of the higher priced sorts are now almost exclusively used. It is hoped that, this fact, to which further attention will be called later in this article, will aid in removing the prevailing notion that certain woods are the only ones suitable for the manufacture of certain articles of furniture, and may help toward the introduction of new woods with substantially similar or even superior properties.

One of the best known woods in the world is mahogany, *Swietenia mahogani* Jacq. It is naturally confined to the Western Hemisphere, where its range is comparatively small, though by planting its distribution has been extended to southern Asia and tropical Africa. This timber has been cut down for several hundred years with a recklessness that is as prodigal and wasteful as that which has characterized the lumbering of some of our own timbers. There is a constantly increasing demand for mahogany, and the exhaustion of this noble tree is not far distant. Within a comparatively few years the mahogany trade with Central and South America will be a thing of the past.

In asking, now, what the possibilities are for the introduction of woods suitable as substitutes for mahogany we enter into a many-sided inquiry. There is, of course, an enormous disproportion between the total number of woods that will be offered as substitutes for mahogany by importers and the number

actually suitable as substitutes. At one time the American birch was often palmed off upon the unsuspecting purchaser. This wood, however, is only likely to be mistaken for mahogany after it has been carefully stained and polished. Other native woods occasionally substituted are cherry, mountain mahogany, *Cercocarpus ledifolius* Nutt., and loblolly bay, *Gordonia lasianthus* (Linn.) Ellis. Importers have tried to palm off a great many other woods from all over the world. Among them are several species of *Cedrela*, to which belongs Spanish cedar, more commonly known as cigar box cedar, so easily recognized by its characteristic odor. Although cedars are as a rule somewhat lighter in weight than mahogany, it is often difficult to tell them apart, even for experts. *Cedrela fissilis* Vell., and *Cedrela guianensis* A. Juss., from Central and South America, are high-class woods. *Cedrela toona* Roxb., from the Philippine Islands, Sumatra, and southern Asia, is highly esteemed as a wood suitable for furniture and interior finish, and could be used in place of mahogany with very little cause for complaint on the part of purchasers. There are other woods belonging to the same family (Meliaceæ) as the true mahogany, that resemble it even more than those of the genus *Cedrela*. Three African species generally known among lumber dealers as African mahoganies are *Khaya senegalensis* A. Juss., *K. grandiflora* Stapf, and *K. purchii* Stapf, which resemble the true mahogany so closely that it often requires an expert to tell them apart. Other genera of this family, such as *Trichilia*, *Guarea*, *Soymida*, *Entandrophragma*, and *Carapa*, yield timbers that are difficult to distinguish from the true mahogany. These genera have representatives growing in the tropics and a number of them have been but little exploited.

The timbers of several African species of *Trichilia* and *Guarea* are now extensively exported under the comprehensive trade names of African cedar or African mahogany. There are several species of *Guarea* in Central

America which yield timber locally esteemed for purposes similar to that for which mahogany is used.

The wood of a number of species of *Euralyptus* has been used in place of mahogany, especially in the form of veneer, for it can be handled most advantageously in this condition when it is to be used for furniture. When the woods of certain species of *Eucalyptus* are carefully stained and highly polished they present a very pleasing appearance and resemble mahogany very closely.

From India, Burma, and the Philippine Islands are imported the woods of several species of *Pterocarpus*, which are often called mahogany, and frequently sold as such. These woods are darker red, heavier, and coarser grained than mahogany, and are less likely to furnish suitable substitutes. Probably the most recent attempt on the part of an importer was to place on the market a so-called Colombian mahogany, botanically known as *Cariniania pyriformis* Miers, a member of the order *Lecythidaceæ*. Although this wood possesses characters almost exactly like those of true mahogany, the two species are not closely related, but belong to two entirely different families.

The wood known as Coccobola, commonly used for making knife handles, is obtained from one or more species of the genus *Lecythis* imported from Central America. The wood is now becoming scarce, but manufacturers have become so accustomed to a wood of this description that they are looking for another kind with similar properties, namely, a hard, dark red wood that may be given a beautiful polish. There are a number that would serve the purpose equally as well as Coccobola. Chief among such substitutes may be mentioned several varieties of *Eucalyptus*, *Diospyros* (ebony), *Dalbergia* (rosewood), *Jacaranda*, and *Machærimum* (known also as rosewoods), *Casalpina* (Brazil), *Pterocarpus* (variously known as barwood, camwood, or santalwood),

and woods of numerous other genera. The choice of these depends upon the natural color of wood desired.

It is true that certain articles require wood of varied characteristics, but the requisites of the woods used for furniture need not be so defined and restricted that only a few on the market can come within the scope of requirements. This is quite different, however, when it comes to woods used for the production of dyes, odors, flavors, tannins, resins, oils, and medicinal substances.

What new cabinet material can be confidently sought for? In his new work entitled "Wood," pp. 85-86 (2d edition), G. S. Boulger enumerates about fifty kinds of foreign timbers that are now used for making furniture. Twelve or more of these come from India, eight from South Africa, ten from Australia, five from New Zealand, eight from tropical America, and still others come from the islands of the Pacific and Indian oceans.

In all, more than one hundred species of Brazilian trees yield high-class cabinet woods that have been but very little exploited. Among the most desirable kinds are as follows:

Acapa-rana, known also as Quina, *Ticorea longiflora* D. C. (Order *Rutaceæ*). Tree, large. Wood, dark colored, hard, and moderately heavy, firm, and highly valued for interior and exterior work, as well as for civil and naval construction.

Accende candeira, *Cassia biflora* Linn. (Order *Leguminosæ*.) Tree, average size. Wood, dark colored, hard, heavy, fine grained, and highly valued for cabinet work; also used for small articles, such as walking canes, mallets, and parquetry work.

Amarellinho da serra, *Galipea simplicifolia* Engl. (Order *Rutaceæ*.) Tree, average size. Wood, pale yellow, very hard, heavy, exceedingly fine and close grained, and very smooth when polished. Used for cabinet work and for building.

Amoreira amarela, *Chlorophora tinctoria* Gaud. (Order *Moraceæ*.) Tree, about fifty feet high and from one to

two feet in diameter. Wood, yellow, hard, moderately heavy, and takes a good polish. Used for cabinet work and for spokes of carriages and wagon wheels and wherever strength and resistance are required. Logs are exported to England, where a yellow dye is extracted.

Andiroba, known also as Crabwood, Caraba, and Carapo, *Carapa guianensis* Aubl. (Order *Meliaceæ*.) Tree, from sixty to 120 feet high, and often six feet in diameter. Wood, reddish brown, resembles mahogany, straight grained, moderately heavy, hard, taking a good polish. Used for building and for furniture.

Angelim, known also as Cabbage tree, *Andira inermis* Kunth. (Order *Leguminosæ*.) Tree, usually dwarfed, thirty to forty feet high, and sometimes six feet in diameter. Wood, reddish brown, hard, very durable, and takes a very beautiful polish. Found in the northern and central parts of Brazil. Under the name *Angelina* several other species are recognized by reason of their firm and hard woods. They are used for building and for naval construction, as well as for furniture, parquetry, and turnery.

Angico, known also as Angica vermelho, *Piptadenia rigida* Benth. (Order *Leguminosæ*.) Tree, forty to fifty feet high, and sometimes two feet in diameter. Wood, reddish brown, hard, moderately heavy, fine grained, and taking a beautiful polish. Used for building, and especially for cabinet work.

Anhauina, *Aiuea densiflora* Nees. (Order *Lauraceæ*.) Tree, average size. Wood, fragrant, usually light brown, hard, close grained, and taking a beautiful polish, especially that of the dark colored varieties. Used for building, naval construction, and cabinet work.

Araroba, *Centrolobium robustum* Mart. (Order *Leguminosæ*.) Tree, forty to fifty feet high, and from one to three feet in diameter. Wood, reddish brown, moderately light in weight, fine and straight grained, soft for cut-

ting, and has closed pores. Used for cabinet and inlaid work. A beautiful red coloring matter is extracted from the wood.

Balsamo or Catholico, *Myrospermum* sp. (Order *Leguminosæ*.) Tree, dark brown, resembling mahogany, very hard, heavy, and very close grained. Used for ornamental objects, cabinet work, turnery, and parquetry. One of the species of *Myrospermum* yields the Balsam of Peru.

Barbatimao, *Stryphnodendron barbatimam* Mart. (Order *Leguminosæ*.) Tree, small, rare, but occurs in all the provinces situated north of the Rio de Janeiro. Wood, grayish brown, moderately hard, very durable and beautiful. Used for cabinet work and turnery. *S. guianense* Benth., native to the Guianas, yields the Hooboballi wood, also suitable for cabinet work.

Bicuhya, or Bicoiba, *Myristica bicuhya* Schott. (Order *Myristicaceæ*.) Tree, tall. Wood, light brown, with darker streaks, moderately hard, tough, rather light in weight, and very durable. This wood remotely resembles mahogany. Used for coffins, building, and cabinet work.

Brazil-wood or Braziletto, *Cæsalpina brasiliensis* Sw. (Order *Leguminosæ*.) Tree, average size. Wood, light red, very hard, heavy, and close grained. It contains bright red coloring matter, which is often extracted for commercial purposes. Used for violin bows and for small articles of furniture, turnery, and parquetry. The available supply of this wood is now almost exhausted, and consequently it is high priced.

Brazil, *Cæsalpina echinata* Laur. (Order *Leguminosæ*.) Tree, forty to fifty feet high, and from one to two feet in diameter. Wood, well known for its use in making dyes; also used for inlaid work and for making small articles of furniture. It is now becoming very rare. Other dye woods are now being substituted, and the remaining trees are often cut down for use as fence posts and other purposes requiring strength and durability. It is also known as Peach wood, Lima, Nicaraqua, and Pernambuco wood. In British Guiana

it is called Bresil de St. Martha. The wood of this species is inferior to Brazil-wood, *Cæsalpina brasiliensis* Sw.

Cabui vinhatico, *Enterolobium latescens* Mart. (Order *Leguminosæ*.) Tree, from sixty to eighty feet high, and from two to four feet in diameter. Wood, light brown, soft, with large open pores and not strong. Used for building, naval construction, and cabinet work. The wood is very durable and light in weight, and therefore very valuable for making small boats.

Cajueiro bravo, *Curatella americana* Linn. (Order *Dilleniaceæ*.) Tree, ordinary dimensions. Wood, hard, moderately heavy, and usually curly, which renders it very desirable for cabinet work. It is also used for general construction purposes. The rough leaves of this tree are used extensively for polishing.

Cumussin, *Carapa grandifolia* Mart. (Order *Meliaceæ*.) Tree, sixty to seventy feet high, and one to three feet in diameter. Wood, reddish brown, with lighter colored veins, moderately heavy, hard, and straight grained, resembling mahogany. Used for building and naval construction, and especially suitable for cabinet work.

Candeia, *Lychnophora ericoides* Mart. (Order *Compositæ*.) Tree, usually small. Wood, white, rather hard, close and straight grained, taking a beautiful polish. Used for cabinet work and turnery.

Carnaüba, known also as the Wax palm of Brazil, *Copernicia cerifera* Mart. (Order *Palmae*.) Palm noted for the uses made of it. Besides the wood, used in cabinet work and ebonizing, it furnishes gum used for wax, oil, vinegar, salts (still little known), and starch. The wax yielded by this tree is used on graphophone cylinders. The fibers are used for making cords, nets, and baskets.

Cedro, *Cedrela fissilis* Vell. (Order *Meliaceæ*.) Beautiful tree of remarkable size; the trunk is sometimes ten feet or more in diameter. Found in all the provinces north of the Rio de Janeiro and especially in the valley of the Amazon, where it attains great di-

mensions. Large, fine planks are obtained from it. The wood, which resembles Spanish cedar, is also used for making cigar boxes, turned articles, images, and furniture. It is becoming so depleted that it is used now only for boxes for the very best cigars.

Cumuru, known also as Tonga bean, Gaiaç, Cuamara, and Tonquin bean, *Dipterix odorata* Aubl. (Order *Leguminosæ*.) Tree, thirty to forty feet high, and about three feet in diameter. Wood, dark brown, with a greenish-yellow coloring matter in the pores; very heavy, hard, rough, and exceedingly cross-grained. It is durable and employed for purposes requiring strength and stiffness. Used for building purposes and, in the form of veneer, for cabinet work.

Cumary or Cuyumary, *Ay dendron cumary* Nees. (Order *Lauraceæ*.) Tree, tall. Wood, brown, light in weight, rather soft, not very durable, and easily worked. Used for building, naval construction, and cabinet work.

Gitahy, *Hymenæa* sp. (Order *Leguminosæ*.) Tree, tall. Wood, yellowish, fine grained, beautiful, very tough and firm. Used for building, wheel-felloes, cabinet work and parquetry.

Grama ruiva, *Macharium brasiliense* Vog. (Order *Leguminosæ*.) Tree, medium height. Wood, dark, sometimes tinged with red; compact, heavy, and resembles the wood of some species of Jacaranda. It has a very fine and even grain, rendering it very desirable for ornamental cabinet work, especially pianoforte cases, turnery, and inlaid work.

Guarabu, *Peltogyne guarubu* Fr., and Guarabu amarello or Pao Roxo, *Peltogyne confertiflora* Bth. (Order *Leguminosæ*.) Tree, tall. Wood, dark purple, hard, heavy, and fine grained. Used for building, naval construction, and cabinet work. The wood imported into the United States under the name of Amaranth is obtained from a species of this genus.

Guarabu preto, *Astronium concinnum* Schott. (Order *Anacardiaceæ*.) Tree, tall. Wood, dark brown, very hard, heavy, close and fine grained, tak-

ing a beautiful polish. Used for building, naval construction, and cabinet work.

Guarajubeira, *Terminalia acuminata* Mart. (Order *Combretaceæ*.) Tree, average size. Wood, light brown, very hard, heavy, and very close grained. Used for cabinet work.

Jacaranda preto, *Macharium legale* Benth. (Order *Leguminosæ*.) Tree, seventy to eighty feet high, and two to three feet in diameter. Wood, usually with dark reddish tinge; one of the most compact and hardest woods known and much in demand for building, cabinet work, inlaid work, and turned articles. This name is applied to several entirely different woods, chief of which is *Dalbergia nigra* Allem., a tree belonging to the same section of leguminous plants. Jacaranda is a general term that applies to the following species: *Macharium firmum* Benth., *M. legale* Benth., and *M. incorruptible* Allem., which are all large, useful trees. On account of this confusion of names, the wood of these trees is often palmed off on the market for the true rosewood of British Guiana. One other species of this genus from British Guiana is *M. schomburgkii* Benth., and produces the beautiful mottled wood called Itaka, Itiki, or Tiger wood, used extensively for furniture.

Jacare-catinga, *Myrica leucadendron* D. C. (Order *Myricaceæ*.) Tree, rather small. Wood, grayish-brown, hard, heavy, and easily worked. Used for building and cabinet work.

Jacariuba, *Calophyllum brasiliense* Camb. (Order *Guttifera*.) Tree, ninety to 120 feet high, and trunk sometimes nine feet in diameter. Wood, usually reddish brown, soft, rather light, fine grained, and taking a good polish. Used for building, naval construction, and cabinet work.

Louro abacate or aquacate, *Persea gratissima* Gaertn. (Order *Lauraceæ*.) Tree, tall. Wood, dark brown or reddish, very handsome, resembling mahogany, moderately hard, heavy, and easily worked. Used for building, naval

construction, and cabinet work. The tree produces a savory fruit known in commerce under the name of vegetable marrow.

Louro amarello, Louro vermelho, or Louro commun, *Persea splendens* Meissn. (Order *Lauraceæ*). Tree, tall. Wood, somewhat similar to the preceding. Used for building, naval construction, interior and exterior decoration, according to the qualities of the different varieties. Excellent planks and fine furniture are also made from it. Grows throughout the greater portion of the northern provinces, but especially in the dry districts of the Amazon Valley.

Louro cheirosa, Louro cheirosa canella, Louro cheirosa cravo, or Louro cheirosa pimenta, *Dicypellium caryophyllatum* Nees. (Order *Lauraceæ*). Tree, large, with straight, clear bole. Wood, pale yellow, hard, compact, and straight grained, durable, and easily worked. It is also known as Sassafras, Pepper-wood, Licari, and Cayenne rose-wood. It is an excellent wood. Used for building, naval construction, cabinet work, and also for industrial purposes. Woods of this genus are fragrant, and yield on distillation the essential oil known as "essence de roses."

Macucu, *Macoubea guianensis* Aubl. (*Inc. Sed.*) Tree, about sixty feet high and nearly three feet in diameter. Wood, light brown, hard, heavy, and fine grained. Used for building, interior decoration, and cabinet work.

Mairapinima, *Centrolobium parense* Jul. (Order *Leguminosæ*). Tree, medium height. Wood, probably the most beautiful in Brazil. It is light brown, moderately heavy and dense, and is used for carpentry, inlaid work, and furniture. It grows in the upper districts of the Amazon region.

Marupa, known also as Simarouba and Acajou blanc, *Simaruba amara* Aubl. (Order *Simarubaceæ*). Tree, very large. Wood, almost white, resembling white pine, moderately hard and heavy. Used for building, exterior decoration, and cabinet work.

Massaranduba, *Mimusops elata* Fr. All. (Order *Sapotaceæ*). Tree, eighty to ninety feet high, and from six to

ten feet in diameter. Wood, very dark brown or nearly black, and one of the hardest known. Used in buildings and carpentry. It is one of the most valuable of all trees.

Pao amarello, *Vochysia obscura* Warm. (Order *Vochysiaceæ*). Tree, fifty to sixty feet high, and about three feet in diameter. Wood, sometimes nearly white, hard, moderately heavy, and close grained. Used for building, naval construction, and carpentry. The useful timber copai-ye-wood of Guiana is derived from *Vochysia guianensis* Aubl.

Pao d'arco, known also as white cedar, Cogwood, and Roble blanco, *Tecoma pentaphylla* Juss. (Order *Bignoniaceæ*). Tree, sixty to 100 feet high, and from eight to ten feet in diameter. Wood, yellowish or sometimes very light brown, hard, compact, even grained, and elastic. Used for building, naval construction, and cabinet work.

Pao santo or Pao preto, *Kielmeyera* Nees. (Order *Lauraceæ*). Tree, medium height. Wood, dark brown, compact, hard, moderately heavy, fragrant, and beautiful in grain. Used for building and valuable for cabinet work; also used in perfumery.

Pao santo or Pao preto, *Kielmeyera excelsa* Camb. (Order *Ternstræmiaceæ*). Tree, large dimensions, the bole being more than three feet in diameter. Wood, dark, very hard, and very dense. It is considered one of the best in Northern Brazil on account of its numerous uses for interior decorations, cabinet work, and hydraulic construction.

Pao violeta, *Macharium violaceum* Vog. (Order *Leguminosæ*). Tree, tall, and two to three feet in diameter. Wood, hard, compact, and of a beautiful light violet color. Used for fine cabinet and inlaid work.

Pao de tanho branco, *Aspidosperma eburneum* Allem. (Order *Apocynaceæ*). Tree, tall. Wood, moderately hard, heavy, very smooth, and fine grained, somewhat resembling mahogany. Used for building, interior decoration, and furniture.

Paparauba, *Simaruba versicolor* A. St. Hil. (Order *Simarubaceæ*.) Tree, sixty to eighty feet high, and about three feet in diameter. Wood, white, rather soft, and works very easily. Used in civil and naval construction and for cabinet work.

Paracauba, or Angelim vermelho, *Andira fraxinifolia* Benth. (Order *Leguminosæ*.) Tree, forty to sixty feet high, and three feet in diameter. Wood, reddish, hard, heavy, usually cross grained, and takes a beautiful polish. Used for civil and naval construction and for cabinet work.

Peroba do campo, *Sweetia elegans* Benth. (Order *Leguminosæ*.) Tree, large, eighty to 100 feet in height, and sometimes four feet in diameter. Wood, varies from a light yellowish to a pinkish hue; the heartwood is sometimes quite red, pinkish, or flesh colored. It is hard, moderately heavy, exceedingly fine grained, and takes a beautiful polish. Used for interior finish, construction timber, and also for furniture, for which it is highly esteemed.

Rabugem or Roble, *Platymiscium blancheti* Benth. (Order *Leguminosæ*.) Tree, sometimes 100 feet high and three to four feet in diameter. Wood, hard, heavy, tough, and beautiful in grain. Used for building and cabinet work.

Tambor, *Macrolobium vaupea* F. Gmel. (Order *Leguminosæ*.) Tree, tall. Wood, hard, heavy, and tough, taking a very good polish. Used for manufacturing wheels and cylinders for sugar machines, and for cabinet work.

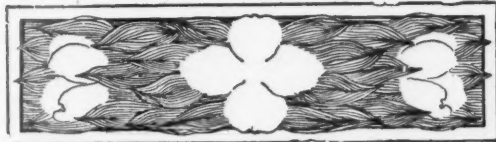
Tamboril, known as Corotu in Panama, *Enterolobium timbouva* var. *Ca-*

nescens Engl. (Order *Leguminosæ*.) Tree, among the most gigantic, attaining a height of ninety to 130 feet, and a diameter of nearly ten feet. Wood, light brown, rather soft, and quite porous, not strong, but durable, and remotely resembling mahogany. Used for building, interior decoration, furniture, and boat building. Small vessels of twelve tons burden have been made out of a single log of this tree.

Tinguaciba, *Xanthoxylon spinosum* Sw. (Order *Rutaceæ*.) Tree, average size. Wood, yellow, hard, heavy, and fine grained, taking a good polish. Used for building and cabinet work.

Uxi, *Couepia myrtifolia* Benth. (Order *Rosaceæ*.) Tree, about fifty feet high and more than three feet in diameter. Wood, hard, heavy, and fine grained, taking a beautiful polish. Used for construction timber and cabinet work.

These names, of but little significance when pronounced in passing, are given merely to emphasize the fact that the kinds of woods useful for making furniture are exceedingly diverse. Constant effort is put forth by importers of foreign woods not only to select the best kinds, but also to search for and discover new woods of which little or nothing is known. South American countries will probably supply the bulk of our cabinet woods in the very near future. Transportation facilities are being speedily developed there, and capital from the United States is pouring in, thus developing natural resources with amazing rapidity.



WHERE FORESTRY CAN BE STUDIED

A FEW years ago the prospective American student of forestry had little choice in his own country of the place where he would study. The first forestry school was opened at Biltmore, North Carolina, thirteen years ago; a little later the Yale Forest School was established, and for a while they stood almost alone. Now there are several schools well manned and equipped to give instruction in forestry of the highest grade, and numerous others are giving a course or courses in this subject. Two colleges, Tufts College in Massachusetts, and the University of California, announce special forestry preparatory courses, made up in great measure of the fundamental sciences on which forestry rests.

The subject is too new in our curricula to be fully standardized and the efforts of many institutions to meet the need are somewhat experimental, but it is nevertheless clear that forestry has won its place in the consideration of our educational authorities.

For the information of those interested a list is published of universities, colleges, and schools in the United States where forestry is taught. Brief statements of the nature and scope of the work done are added to each case. This information has been gotten from the published announcements of the institutions themselves and an effort has been made to make it as accurate and complete as possible. AMERICAN FORESTRY will be grateful for any correction or additions, now or in the future, so that accurate information may be available at all times to its readers and friends.

GRADUATE SCHOOLS

There are three graduate schools offering to college graduates the highest grade of professional training and

fitting their students for the best places in the profession. They are departments of three of our oldest universities. Each of these schools is thoroughly equipped and has demonstration forests and access for practice work to private or state-owned forest lands.

Yale University, New Haven, Connecticut, Yale Forest School (founded in 1900). A graduate department requiring for admission a college training. A two years course leading to the degree of Master of Forestry. An undergraduate preparatory course is given in the Sheffield Scientific School.

University of Michigan, Ann Arbor, Course in Forestry (founded in 1901). A graduate course leading to the degree of Master of Science in Forestry. Undergraduates in the University who pursue a course leading to forestry may take the degree of Bachelor of Arts at the end of the fourth year and the degree of Master of Science in Forestry at the end of the fifth year. For those who begin the study of forestry after graduation the course is two years. Work in forestry for the doctorate of science or of philosophy is also open.

Harvard University, Cambridge, Massachusetts, Division of Forestry, School of Applied Science. Open to graduates of a college or scientific school of good standing. A two years course leading to the degree of Master in Forestry.

Two universities have recently organized colleges of forestry on coordinate lines with the other departments, providing for undergraduate as well as graduate work.

University of Minnesota, Minneapolis, College of Forestry. A four years undergraduate course leading to the degree of Bachelor of Science in Forestry; entrance requirements, those of the university. Also a graduate course of not less than one year leading to the degree of Master of Forestry. The degree of Doctor of Science may also be obtained by bachelors of this or any other forestry college of equal grade within not less than three years after graduation under conditions prescribed by the faculty of the graduate school.

University of Washington, Seattle, School of Forestry (established 1907). A four years' course leading to the degree of Bachelor of Science in Forestry. Also a two years graduate course leading to the de-

gree of master of Science in Forestry. This school has a good equipment, the nucleus of a forest museum, and is in the heart of a great timber country near extensive national forests.

UNDERGRADUATE COLLEGE COURSES

A number of colleges, especially the land grant institutions, have instituted undergraduate forestry courses of four years. The facilities of these institutions vary considerably and the courses are not standardized as yet, but they represent useful beginnings and provide opportunities for forestry study for many who cannot meet the requirements of the higher schools. Some of them are well equipped and have competent instructors.

Colorado College, Colorado Springs. School of Forestry (established 1905). A four years course leading to the degree of Forest Engineer, and a graduate course of one year leading to the degree of Master of Forestry. Has a demonstration forest of 13,000 acres and is near the natural forests. There is a summer course and a special twelve weeks' course for forest rangers and guards.

Colorado Agricultural College, Fort Collins. The four years courses in the division of agriculture differentiate in the junior year, and for the course in forestry the junior and senior years are given to technical subjects. The degree is Bachelor of Science.

University of Georgia, Athens, College of Agriculture. School of Forestry. A four years degree course and a summer course.

University of Idaho, Moscow. A four years course leading to the degree of Bachelor of Science in Forestry. Has good equipment and demonstration forest of 640 acres.

Purdue University, Lafayette, Indiana. Arranged as one of the four years courses in science leading to the degree of Bachelor of Science. The forestry course are classified under the department of biology.

Iowa State College, Ames. Department of Horticulture and Forestry. Special attention is given to farm forestry under Iowa conditions. A mixed course, not to be regarded as a technical course in forestry.

University of Maine, Orono. A complete undergraduate course in forestry is arranged, which may serve as the basis not only of practical work in forestry, but also of a liberal education. A knowledge of the principles of forestry in its different branches is given to the student, and some practical

work is done in the forest. Degree of Bachelor of Science.

Michigan Agricultural College, East Lansing. Forestry course (established 1902). Four years course, the work of the freshman and sophomore years practically the same as for agricultural students; strictly technical work begins in junior year. Degree of Bachelor of Science.

University of Montana, Missoula. Four years course leading to degree of Bachelor of Science. "The courses of study as at present outlined are designed to prepare students in the fundamental subjects of forestry. From one to two years of graduate work will be necessary for those desiring to become professional foresters." There is a short course for forest rangers in January, February and March. The location in Missoula of the headquarters of District No. 1 of the United States Forest Service is noted as one of the advantages of this institution.

University of Nebraska, College of Agriculture. A four years course leading to the degree of Bachelor of Science. For a fifth year of approved work the degree of Master of Forestry may be obtained.

Oregon Agricultural College, Corvallis. "To meet the needs of the State in conservation and development of its forest resources, the College has provided a regular course of four years, which will be supplemented with a winger short course." Degree of Bachelor of Science in Forestry.

Pennsylvania State College, State College. "The course in forestry is planned to give students a thorough and practical training, so that upon graduation they may take up professional forest work." Degree of Bachelor of Science for four years course.

State College of Washington, Pullman. This college announces a four years course in forestry leading to the degree of Bachelor of Science.

In a class by itself because of its organization, methods, and purposes, is the unattached

Biltmore Forest School. This is a school of "purely technical forestry," now in its thirteenth year. The course of one year, supplemented by six months of practical work, leads to the degree of Bachelor of Forestry. After two years experience and the presentation of a thesis a Bachelor of Forestry may receive the degree of Forest Engineer. The school holds a winter session in Germany, a spring session in Adirondacks and southern Appalachians, and during the autumn months in the Lake States.

FORESTRY ONE SUBJECT IN COURSE

The following colleges and universities give one or more courses in fores-

try. It should be noted that these can in no case be considered training for the profession of forestry. They are at best partial and elementary, giving such knowledge as may be considered properly a part of a general education, and particularly of agricultural education. In most cases they are designed for the latter purpose.

Alabama Polytechnic Institute, Auburn. A one term course in the senior year in the department of agricultural sciences on forest conditions of Alabama and care of woodlots.

Connecticut Agricultural College, Storrs. A course in the spring term "to give students an idea of practical forestry in Connecticut."

Delaware College, Newark. A course dealing with the elements of forestry in the agricultural course, second term, senior year.

Kansas State Agricultural College, Manhattan. Two junior courses—one in farm forestry and one in silviculture.

University of Illinois, Urbana. A brief course as an elective.

Berea College, Berea, Kentucky. Course on fundamental principles of forest influences, in the fall term.

Maryland Agricultural College, College Park. Elementary forestry in the sub-freshman year; farm forestry in the senior year, and wood technology in the second term of senior year.

Massachusetts Agricultural College, Amherst. This college has had since 1905 a short course of lectures by the State forester. It has secured this year an assistant professor of forestry and a course is planned covering silviculture, dendrology, forest mensuration and nursery practice the first year, and forest management, lumbering, technology, and handling of woodlots the second year.

Mississippi Agricultural and Mechanical College, Agricultural College. Single term courses in farm forestry, silviculture, and forest policy.

University of Missouri, Columbia. Courses on principles of forestry and introduction to forestry. This university is now establishing a department of forestry and intends to develop a stronger course leading to a forestry degree.

University of Nevada, Reno. One-term course in elementary forestry, primarily for the junior colleges.

New Hampshire College, Durham. One-term courses in principles of forestry, forest technology, systematic arboriculture, and forest nursery management, the first required, the others elective for students in the full agricultural course. Also a one-term

course in farm forestry for students in the two years agricultural course.

North Dakota Agricultural College, Fargo. A course in the spring term of six weeks, devoted chiefly to North Dakota conditions.

Oklahoma Agricultural and Mechanical College, Stillwater. A one-term course devoted chiefly to planting and care of trees in Oklahoma.

Rhode Island State College, Kingston. A one-term course on the management of a southern New England woodlot.

Clemson Agricultural College, Clemson, South Carolina. A lecture, field and laboratory course in elements of forestry.

South Dakota State College of Agriculture and Mechanic Arts, Brookings. A one-term course in the principles of forestry.

University of Tennessee, Knoxville. A one-term course in principles of forestry.

Agricultural College of Utah, Logan. The United States Forest Service and the college offer conjointly a winter course for forest rangers.

University of Vermont, Burlington. An elective course, "not intended to make foresters, but to give students a working knowledge of forestry such as is needed by the farmer and lumberman, and to enable them to decide whether they wish to pursue the study at a forest school."

Middlebury College, Middlebury, Vermont. A one-term elective on general principles. President Thomas says: "We have not in mind, of course, the adequate training of young men as foresters, but a fitting introduction to technical studies and an attempt to show the practical application of previous studies in botany. It is our hope that we may be able to do much more in the future in the way of practical instruction in forestry."

Hampton Normal and Agricultural Institute, Hampton, Virginia. An elementary course in general principles.

West Virginia University, Morgantown. Offers six half courses in forest botany, elements of silviculture, forest economics, forest technology, forest management, and forest mensuration and survey.

SPECIAL COURSES

University of Wisconsin, Madison. Considering that the field of general higher forestry education in the Lake States is sufficiently covered by the schools of the University of Michigan and Minnesota, this university seek to fill an unoccupied place and avails itself of the opportunity offered by the conjunction of its excellent engineering plant and the United States Forest Products Laboratory to conduct a series of courses in wood technology and wood manufacturing machinery.

Pennsylvania State Forest Academy, Mont Alto. This is a special school to prepare young men for the State Forest Service and vacancies are filled by appointment after competitive examination. Students must complete a three years course and remain in the State service at least three years after graduation.

SECONDARY SCHOOLS

Eric Forest School, Duxbury, Massachusetts. Gives an elementary course in forestry, with either regular high school work or special subjects. Prepares for higher forest schools.

Mount Hermon School, Mount Hermon, Massachusetts. Has as a part of its curriculum a course in the elements of landscape gardening and forestry.

Smith's Agricultural School, Northampton, Massachusetts. "We pay attention to for-

estry and shall do forestry work on our farm for demonstration purposes with our students for the benefit of the public. Our instruction will be primarily the kind that will be the most value to boys that intend to operate their own farms and want to know what are the best forestry methods for their own use."

Crookston School of Agriculture, Crookston, Minnesota. Affiliated with the State University. Teaches farm forestry with reference to the needs of the prairie region in which it is located.

North Dakota School of Forestry, Bottineau. This is a State institution, with an agricultural and industrial course. The school is mis-named, as forestry occupies only a minor place in its course.

Murray State School of Agriculture, Tishomingo, Oklahoma. Forestry occupies its usual place in a school of this class as one subject in an elementary agricultural course.

THE WOODS OF THE PHILIPPINES

So little is known in America of the 400 or more merchantable woods of the Philippine Islands, and so difficult is it even for a wood technologist to identify them, that a recent announcement of the Philippine Bureau of Forestry will doubtless be welcomed by student and timber-user alike. Arrangements have been completed for the general distribution of samples of all of the Philippine woods of any commercial importance, and also of a large number of the rare and little-known species. Each sample is about 4x5 inches and $\frac{3}{8}$ in thickness, with planed surfaces. They can be readily fitted into a case or used as desk specimens, paperweights, etc. An attached label gives the scientific name and the native name by which the wood is most generally known in the Philippines. Samples from the great bulk of the woods are sold at a nominal cost of 10 cents each (U. S. Currency), but those which are difficult to replace, or whose hardness or toughness of grain makes them rather expensive to saw out, are sold at 20 cents apiece. These latter comprise the following species:

Agoho	Kuyus-kuyus
Anubing	Dungon
Betis	Ebony
Camagon	Alupag

Bansalaguin	Mancono
Bolongeta	Narig
Camuning	Oak
Dalinás	Palo Maria
Dungon-late	Sasalit
Ipil	Tamayuan
Liusin	

All others are sold at 10 cents each. The weight of each sample averages about four ounces, and if they are to be mailed to the United States, 4 cents per sample should be added to the above prices. The post-office money orders should be made payable to the Director of Forestry, Manila, P. I. Stamps will not be accepted.

If the purchaser wishes, he may leave the selection of the samples to the Bureau of Forestry, simply stating the number of samples he desires, and the use to which he wishes to put them, or the class of woods in which he is interested; e. g., for use as school collections, woods for furniture manufacture, etc.

Of course, it is not expected that the mere possession of such samples will make their owner an expert in identifying Philippine woods; but they may often prevent his being imposed upon through either the ignorance or the bad faith of the vendor.

EDITORIAL

The Tasks Set Before Us

THE forestry movement in America has passed its first propagandist stage. The awakening of public interest has come; schools, colleges and universities are taking cognizance of this subject; a national forest service, in which we may take pride, has become a permanent part of the administrative branch of the government; many of the states have established similar departments; we are fast coming to a knowledge of our forest resources, their possibilities and requirements.

In bringing about all this the American Forestry Association, which holds its thirtieth annual meeting in Washington on the twelfth and thirteenth of January has had a large and honorable part. It led the way in the organization of the people to secure these results and its influence, guided steadily by the leaders of the movement, has been potent for good through all these years.

We are facing a new period of real constructive work. Our original thesis—the need of scientific forestry—is conceded among intelligent citizens. The next steps are those of education and of the rounding out of our forest policy, establishing the latter, when the right way has been determined, through well-framed state and national laws.

The first task—that of arousing the people—was not easy. The second is more difficult and demands the application of highly trained effort. But the means are at hand for this. The Forest Service commands the efforts of highly trained specialists, whose work is partly educational as well as administrative. The same is true of the state services in those commonwealths which have progressed so far as to have them. The various associations, national, state

and local need not feel that their work is done. The best is yet before them, but they must not be content with the old methods of agitation and propagandism. They must set before themselves definite tasks, educational and practical. Sound knowledge and wise laws, trained men to administer, and an informed citizenship to support them are what we need now.

The general movement for conservation of natural resources, which is being broadened into a general overhauling of our economic methods, has taken a strong hold upon the country. The details of its application may be criticized by interested persons, but the people believe in it. In this movement because of its broad relationship and because it led the way, forestry occupies a central place.

This is the way the American Forestry Association looks at its work, with its face to the front, preparing for a larger usefulness even than in the past. To the work of education much attention must be directed and in this number of the magazine will be found, we believe, the most complete and authoritative list that has yet been published of the schools, colleges, and universities in the United States that teach forestry in some form. We expect to publish much material of a directly educational character during the coming year.

In addition to such work, we wish to see a rounding out of our national and state forest policy along the broadest lines, so that waste land in this country of ours will be reduced to a minimum and water, soil, and climate preserved by ample and well managed forests under national, state, municipal, and private ownership.

Is not the task sufficient and worth while? Do you not want to share in it?

A Senator's Monologue

AN ARTICLE by Senator Thomas H. Carter, of Montana, appeared in *Leslie's Weekly* for October 27 under the caption "Common Sense and Forest Conservation." It deals particularly with the conditions developed by the recent fires in the national forests, and on account of the prominence of the author and the fact that he comes from a national forest state, it is likely to carry more weight than it merits. It is entirely characteristic of its author in the skill with which certain things are avoided and others are said. With gentle indignation Mr. Carter defends himself and other senators and representatives of his section against the belief that they are hostile to the preservation of the national forests in their states and districts. We shall not undertake to trace the details of the senator's record in Congress in regard to land and forest legislation, but we suggest that before accepting in full his general statement it might be interesting to explore the Congressional Record, although he is one of those whose ulterior thoughts and purposes are not fully revealed by that interesting but sometimes disappointing publication. We recall him in the Sixtieth Congress as one of that distinguished trio, Senators Teller, Heyburn and Carter, who prevented a vote on the Weeks Bill when it came over from the House by threatening to talk out the session. The point of Senator Carter's article is not, however, his own legislative record, but his criticisms of the Forest Service for the use that has been made of its appropriations.

The Senator says that in the "last ten years some \$20,000,000 were placed at the disposal of the Forestry Bureau to prepare for the battle with the flames." This statement is loose and inaccurate, inexcusably so, because the uses to which the appropriations have been put are prescribed by law in each appropriation bill, and their expenditure is duly accounted for in the annual reports of the Forester, printed documents accessible to every American citizen.

In the first place the Forestry Bureau (Forest Service) has not had ten years' appropriations "to prepare for the battle with the flames." The forest reserves now known as national forests were administered by the Interior Department until 1905, when they were transferred to the Department of Agriculture, in order to unify our forest administration. The appropriations that have been available for the use of the bureau which Senator Carter undertakes to criticise, cover therefore only the years 1906, 1907, 1908, 1909, 1910, and the current year, which ends on the 30th of next June. The amount of the total appropriations for all the work of the Forest Service during this period is considerably under twenty million dollars. The element of time is an important one. It takes a considerable period of time, more than five years, even with much larger appropriations than Congress has allowed, to train a numerous body of guards and rangers, make improvements, such as roads, trails, lookouts, and telephone lines and instal equipment on over 160,000,000 acres, much of it the wildest and most inaccessible forest land on the continent.

The Senator from Montana knows that the appropriation bill for the Forest Service, as for other bureaus, fixes first a list of statutory salaries. This part of the bill is definite and unchangeable. Then there is a paragraph devoted to general expenses. This appropriates a lump sum for a great variety of purposes, all of them important, most of them absolutely necessary for carrying out the purposes of the Service. Included in this omnibus paragraph is the clause, "to pay all expenses necessary to protect, administer, and improve the national forests," but in the later appropriation bills there is another specific paragraph providing for "Improvement of National Forests," the appropriation for this purpose for the year ending June 30, 1910, being six hundred thousand dollars. There is an established ruling of the Treasury Department that when a specific provision is thus made it supersedes a general clause, like the first

cited. Hence for the purpose enumerated in the last paragraph—"construction and maintenance of roads, trails, bridges, fire lines, telephone lines, cabins, fences and other permanent improvements necessary for the proper and economical administration, protection, and development of the natural forests"—the Service was restricted to the specific appropriation of six hundred thousand dollars.

Senator Carter knows these things, he has heard the work of the Service discussed, and its needs presented. Has he ever assisted the service to secure a more adequate appropriation for the guarding and improvement of the forests, the need of which he urges in the article to which we refer?

The educational work of the Service costs but a few thousand dollars a year, is limited in scope by legislation, but has accomplished much in enlightening the public on an economic question not generally understood. Yet Senator Carter refers to this work almost contemptuously and implies that it is a useless extravagance and has absorbed very large sums. Has he any objection to having the people enlightened as to their national domain and its proper management? Nothing would show more conclusively the importance and necessity of this kind of work than the state of mind on this subject of the Senator from Montana. If he, charged with legislative responsibility for the interests of government, understands so little the purposes, accomplishments, resources, and needs of this bureau how much must the public generally need information?

The Senator protests his regard for the forestry work of the government and his support of it, yet he advocates putting all of the appropriation into guards and improvements for the national forests; that is, he would support the Service by cutting off its head, making it all legs and arms with no directing mind and nerve centres. He knows perfectly well that a great bureau like this, charged with varied and important scientific investigations and experiments, with the dissemination of accurate knowledge, and with the prac-

tical administration of a vast public domain, must have a great organization, must be a big administrative machine, with all its parts co-ordinated. For this purpose and this work the organization of the Forest Service is none too large or costly. It is, on the other hand, an efficient and economically conducted bureau. There is being built up year by year an operating system and a working force in the national forests of which the nation may well be proud. Its improvement can be hastened by more liberal appropriations.

Why then, this demagogic attempt to show that the modest appropriations for the Forest Service should all have been expended for guards and improvements in the national forests? The Senator knows something of business organization. Does he think the government bureaus can retain their efficiency without it?

Senator Carter cites the German forest system as one we could have emulated to better effect. Does he know anything of the highly developed German organization, of what machinery is required to keep the model system working smoothly, of the training of the forest officers and guards, and of what is required of them as compared with our own? The German national forest system has been the growth of over two centuries of experience, scientific investigation, and its practical application. Our system is less than twenty years old. The present organization has had about five years in which to shape its practice. Germany spends about two dollars an acre on its forests; we spend a little less than two cents.

Since Senator Carter has introduced this little comparison, which seems to us the most unfortunate that he could have made, it seems to be fair to ask if he will assist in providing the funds necessary to attain at the earliest period a like complete and perfect organization here?

Will he assist us to establish national forests in the White Mountains and Southern Appalachians, which Germany

would never allow to be devastated as we are doing?

Save for the position of its author, the article we have been discussing would not be worthy of serious consideration. Careless in statement, disingenuous, disregarding facts accessible to every citizen and which every member of Congress has placed before him in the day's routine, it is the special plea of a politician who is a past master in the art of using language to conceal thought.

Fire Losses and Fire Fighting

THE estimate of the fire losses of the year as given in the November number of *AMERICAN FORESTRY* have been questioned by some excellent authorities. In particular the *American Lumberman* reviews them somewhat at length, and in certain instances throws doubt on them without giving sufficient attention to the context.

We believe these estimates were conservative and were as nearly correct as they could be made at this time. In the very nature of the case estimates of this kind must use figures in a large and general way, and it is always to be remembered that while there is a considerable salvage of burned timber suitable for lumber, this can never equal in value the unburned forest, and some of the largest and most lasting losses from a great forest fire can never be figured in dollars and cents. This is an axiom but it must not be forgotten.

We ask that our statement of what forest fires cost in 1910 be read carefully as it was printed. As regards the total loss in money this magazine reduced all newspaper estimates and based its computations upon the best authorities obtainable. The results were checked by working from known areas and probable stumpage. If the estimate so obtained does not seem correct we invite our critics to work out a better one. Thus far we have seen no attempt in this direction.

In comparing the national and privately owned forest losses we made two distinct statements, in separate paragraphs. The *American Lumberman* runs these together and misapprehends their real significance. In the first of these paragraphs we said: "It is probable that state and private owners suffered more nearly three times than twice as heavily as the nation by these fires," that is the fires in the northwestern states. This referred to absolute losses and not losses in proportion to area. In the next paragraph we broadened the comparison to include the whole country and made this statement: "A comparison of the public losses with the private losses for the whole country indicates that the private losses were seven times greater than the public losses, in spite of the fact that privately owned forests are not more than five times greater in extent and are more accessible than those privately owned." Here again it was absolute and not proportionate losses that were referred to and it must be remembered that privately owned forests outside of the northwestern states have practically no protection. We were not constructing a brief for national ownership but were trying to get at the actual losses sustained by the American people whether in their private or corporate capacity. The *American Lumberman* seems to think that we were trying to show that the government protected its forests seven times better than private-owners, which was far from the intent of our thought or the sense of our words. We do say unhesitatingly that the government forests are somewhat better protected than those of the country as a whole, many of the latter having no protection at all.

The government forests are, as we have said, more inaccessible and difficult to protect than most private holdings because they have not been located primarily on account of practicability for profitable lumbering. They have also been inadequately manned, as our forest authorities have constantly maintained, this being due to insufficient appropriations, for which certain senators and representatives from national forest states must bear a considerable share

of responsibility. Nevertheless, the showing of the national forests in the way of fire protection has been good, all things considered, and the national Forest Service led the way and showed the method for state and private protective work which has since been undertaken. If the latter has bettered the teaching, it is because obstructive legislation has held the national service back. Never forget that fact when stones are being thrown at the Forest Service. No better testimony to the leadership of the national service can be given than that of E. T. Allen, for-ester of the strongest private protective association in the country, the Western Forestry and Conservation Association. His article in the November number may be profitably read in this connection.

Therefore we think the *American Lumberman* put the case too strongly when it said: "Instead of leading, the government is trailing;" but we subscribe cordially to what follows: "The Forest Service has done good work within the limitations set upon it by a Congress which was compelled to trim its appropriations at some point and found the Forest Service a convenient victim." And further: "The principal lesson from the experience of 1910 demonstrates the advisability, the absolute necessity of equipping the Forest Service to protect that great portion of the public wealth which is entrusted to its charge." Our contemporary even goes so far as to hold that if over-estimates will help to arouse public sentiment and loosen the purse strings of Congress "they will serve a useful purpose."

A Haunted Editorial Office

THE Roosevelt specter has made the *New York Times* reactionary on questions in regard to which it has heretofore been sound and sane. A recent editorial charged up the forest fires to the "new nationalism" on the ground that Mr. Pinchot and Mr. Roosevelt had been largely responsible for creating the national forests and that they did not make their "efficient machine" pro-

vide a system of fire protection.

The argument of the *Times* overshoots its mark and returns upon its author. In the first place the fire protection record is far better in the national forests than anywhere else in the country, except in certain limited sections where the lumbermen have banded together and adopted Forest Service methods. In the second place, it has been the failure of the legislative branch of the government, owing to the obstructive tactics of representatives and senators to the national forest policy, that has limited the efficiency of the national protection work by refusing to satisfy manifest needs of the forest service. It pleases Mr. Roosevelt's enemies to represent him as a dictator, but he wasn't by any means. We hold no brief for any person or political theory, having larger work to do, and we suggest that if the *Times* will also clear away political and personal prejudice from its discussions of this subject it will do better.

The Reward of Good Citizenship

THE election of Robert Perkins Bass to the governorship of New Hampshire is a matter of much interest to the country, and especially to readers of this magazine. Mr. Bass came to the front in New Hampshire through his work in behalf of forestry in the state, demonstrating his unselfish citizenship and his thorough efficiency in the reorganization of the State Forestry Commission, of which he became chairman. Last January he was made a director of the American Forestry Association.

Mr. Bass is a young man to have gone so far. He still has long years of usefulness before him, a fact upon which his state and the nation may be congratulated, for he belongs to the type of quiet, efficient, democratic citizens who are needed at the front now and always, men who without self-seeking give of their opportunity to the service of the state. Our readers will be interested in the brief sketch of the public service of Mr. Bass in New Hampshire given on another page by Philip W. Ayres.

CURRENT LITERATURE

MONTHLY LIST FOR NOV., 1910

(Books and periodicals indexed in the Library of the United States Forest Service).

Forestry as a Whole

Bibliographies

United States—Supt. of documents. Forest service bulletins, circulars, silvical leaflets, etc., relating to forests, for sale by the Supt. of documents. 2d ed. 22 p. Wash., D. C., 1910. (Price list 43.)

Proceedings of association

Society of American Foresters. Proceedings, vol. 5, no. 1. 151 p. Wash., D. C., 1910.

Forest Aesthetics

Street and park trees

Jäger, H. and Beissner, L. Die ziergehölze der gärten und parkanlagen. 3d ed. 629 p. Weimar, B. F. Voigt, 1889.

Forest Education

Forest schools

Biltmore forest school. Announcement, 13th year, 1910-1911. 40 p. Asheville, N. C., The inland press, 1910.

Forest Botany

Trees, classification and description

Brown, Harry B. The genus *Crataegus*, with some theories concerning the origin of its species. 10 p. N. Y., Torrey botanical club, 1910.

Silvics

Studies of species

Boisen, Anton T. and Newlin J. A. The commercial hickories. 64 p. illus., plates. Wash., D. C., 1910. (U. S.—Agriculture, Dept. of—Forest service. Bulletin 80.)

Reproduction

Graves, Henry Solon. The study of natural reproduction of forests. 23 p. Ithaca, N. Y. Forestry quarterly, 1908.

Forest Protection

Insects

Rogers, D. M., and Burgess, A. F. Report on the field work against the gypsy moth and the brown-tail moth. 81 p. illus., plates, map. Wash., D. C., 1910. (U. S. Agriculture, Dept. of—Entomology, Bureau of. Bulletin 87.)

Stebbing, E. P. A note on the preservation of bamboos from the attacks of the bamboo beetle or "shot-borer." 18 p. Calcutta, 1910. (India—Forest dept. Forest pamphlet, no. 15.)

Forest Management

Ashe, W. W. Management of loblolly and shortleaf pines. 17 p. New Haven, Conn., Yale publishing association, 1910.

Hawes, Austin F. Conversion of coppice under standards to high forests in eastern France. 7 p. pl. Ithaca, N. Y., Forestry quarterly, 1908.

Forest mensuration

Braniff, Edward A. Extending a log rule. 5 p. Ithaca, N. Y., Forestry quarterly, 1908.

Tiemann, Harry D. The log scale in theory and practice. 41 p. New Haven, Conn., Yale publishing association, 1910.

Forest Administration

Great Britain—Commissioners of woods, forest and land revenues. 88th report. 124 p. London, Eng., 1910.

National and state forests

United States—Congress—House—Committee on public lands. Hearings held May 18, 20, 21, 23, 24, 1910, on H. R. 20683 "To abolish the Ozark national forest" and H. R. 21894 "To exclude from Arkansas national forest all lands within the county of Montgomery and restore same to public domain." 194 p. Wash., D. C., 1910.

Forest Utilization

Lumbering

Chapman, Herman H. An experiment in logging longleaf pine. 11 p. Cambridge, Mass., Forestry quarterly, 1909.

Williams, Asa S. *Logging by steam*. pl. Ithaca, N. Y., Forestry quarterly, 1908.

Wood using industries

Maxwell, Hu. *The wood-using industries of Maryland*, with a chapter on Maryland's lumber and timber cut and the timber supply by F. W. Besley. 58 p. Baltimore, Md., Maryland state board of forestry, 1910.

Simmons, Roger E. *Wood-using industries of North Carolina*. 74 p. 6 plates. Raleigh, N. C., E. M. Uzzell & Co., state printers, 1910.

Auxiliary Subjects

Conservation of natural resources

Colorado conservation commission. *Official proceedings*, March 1909—April 1910. 191 p. Denver, Colo., 1910.

Maryland conservation commission. *Report*, 1908-1909. 204 p. plates. Baltimore, Md., 1909.

White, J. B. *Conservation in relation to lumbering*, an address delivered before the Southern conservation congress at Atlanta, Oct. 8, 1910. *Conservation*, its purposes and its application to the country's natural resources, an address delivered at the 2d National conservation congress at St. Paul Sept. 6, 1910. 21 p. St. Louis, Mo., St. Louis lumberman, 1910.

Botany

Hitchcock, A. S. and Chase, Agnes. *The North American species of Panicum*. 396 p. illus. Wash., D. C., 1910. (Smithsonian institution—U. S. national museum. Contributions from the U. S. national herbarium, vol. 15.)

Pammel, Louis Hermann. *A manual of poisonous plants, chiefly of eastern North America*. pt. I. 150 p. illus., plates. Cedar Rapids, Ia., The Torch press, 1910.

Standley, Paul C. *The type localities of plants first described from New Mexico; a bibliography of New Mexican botany*. 104 p. maps. Wash., D. C., 1910. (Smithsonian institution—U. S. national museum. Contributions from the U. S. national herbarium, vol. 13, pt. 6.)

Periodical Articles

General

American homes, Oct., 1910.—Topiary art, by A. J. Brown, p. 387-9; To limit our forest fires, supplement 5.

Collier's weekly, Sept. 24, 1910.—Idaho's thirty days' war against forest fires, by E. B. Fussell, p. 16.

Country life in America, Nov., 1910.—Racing an avalanche, by E. A. Mills, p. 39-42.

Journal of the Franklin institute, Nov., 1910.

—Cellulose, by C. G. Schwabe, p. 371-84. *Naturwissenschaftliche wochenschrift*, Oct. 30, 1910.—Waldbrände in Nordamerika, by E. Deckert, p. 689-94.

North American review, Oct., 1910.—The public and the conservation policy, by J. R. McKee, p. 493-503.

Philippine agricultural review, Sept., 1910.—Arbor day in the Philippines, by J. S. Potter, p. 536-41.

Philippine journal of science, series C, Sept., 1910.—The bamboos of the Philippine Islands, by J. S. Gamble, p. 267-81.

Plant world, Oct., 1910.—The rate of establishment of the giant cactus, by F. Shreve, p. 235-40; Mistletoe in the southwest, by J. C. Plumer, p. 240-6.

Scientific American, Sept. 3, 1910.—How to double the life of standing poles, by J. C. Morin, p. 179.

Scientific American, Sept. 17, 1910.—How the government fights forest fires, by C. A. Sidman, p. 213, 225.

World's work, Nov., 1910.—The fight for conservation; the rousing congress at St. Paul and the emphasis it gave to an aggressive national policy, by A. W. Page, p. 13607-11.

Trade journals and consular reports

American lumberman, Oct. 15, 1910.—Conservation from the viewpoint of a former president of the United States, by T. Roosevelt, p. 53; Conservation in relation to lumbering, by J. B. White, p. 534; Work of the Forest service in the south, by J. G. Peters, p. 54-5.

American lumberman, Oct. 29, 1910.—Skidding, p. 41.

American lumberman, Nov. 5, 1910.—Identity and characteristics of cabinet woods of the future, by C. D. Mell, p. 40-1.

American lumberman, Nov. 12, 1910.—Properties, preparation and increasing utilization of lodgepole pine, p. 39; Character, extent and manufacture of the white cedar of New Jersey, p. 40-1; Oregon's logged off lands, p. 42; Protecting the forests of the northern states against losses by fires; timber owners of the lake states effect an association for measures of conservation, p. 44-5.

Barrel and Box, Oct., 1910.—White gum wood; tupelo and its value as a box-making material, p. 47-8.

Hardwood record, Oct. 25, 1910.—True and spurious mahogany, by C. D. Mell, p. 31-2; Woodworking machinery in Russia, by John H. Snodgrass, p. 33-34.

Journal of electricity, power and gas, Oct. 20, 1910.—Creosote treatment of poles, by G. R. Ogier, p. 383-5.

Lumber review, Nov. 1, 1910.—Lumber and the industry of Hokkaido, by T. Simmons, p. 17.

- Lumber trade journal, Nov. 1, 1910.—County fairs show cutover land possibilities, p. 15-16.
- Mississippi valley lumberman, Oct. 21, 1910.—Taxation of timber land, by E. T. Allen, p. 39-40.
- Mississippi valley lumberman, Oct. 28, 1910.—The most effective measures for reducing timber fire hazard, p. 26-7; The fire hazard in standing timber, p. 30.
- Municipal engineer, Oct., 1910.—Wooden block pavement tests in Minneapolis, Minn., by D. M. Avey, p. 265-70.
- Pacific lumber trade journal, Oct., 1910.—Commercial possibilities of western hemlock bark, p. 30-1.
- Paper trade journal, Sept. 29, 1910.—Successful cotton hull fibres, p. 36; An essay on paper fibres, by C. R. Dodge, p. 44-6.
- Paper trade journal, Oct. 6, 1910.—Forest products laboratory, p. 38, 40, 44.
- Paper trade journal, Oct. 13, 1910.—Forest blaze sweeps northern Minnesota, p. 8-9.
- Paper trade journal, Nov. 3, 1910.—Wood pulp situation in the province of Quebec, p. 8-9.
- Pioneer western lumberman, Oct. 15, 1910.—Logging situation in British Columbia, by J. S. Emerson, p. 11, 13; Conservation questions, by E. G. Griggs, p. 15; Merits of Pacific Coast woods for door and finishing purposes, by T. E. Ripley, p. 21, 23.
- Pioneer western lumberman, Nov. 1, 1910.—Timber conservation from a western point of view, by G. H. Emerson, n. 19, 21, 23.
- Railway and engineering review, Oct. 15, 1910.—The tendency in tie preservation, p. 966-7.
- St. Louis lumberman, Oct. 15, 1910.—Our latest forest conflagration and fire prevention, p. 52-3; An experiment in wood block paving, p. 53.
- Southern industrial and lumber review, Oct., 1910.—The timbers of western Arkansas and eastern Oklahoma, by F. M. Alexander, p. 35; New government grading rules for yellow pine, p. 52; Texas turpentine, p. 52; Prevention of forest fires in Saxony, by C. B. Hurst, p. 59; Log loader as railroad track builder, p. 64.
- Southern lumber journal, Oct. 15, 1910.—Forest and soil conservation, by W. W. Finley, p. 41-2.
- Southern lumberman, Oct. 8, 1910.—Turpentine men witness experiment, p. 27.
- Southern lumberman, Oct. 15, 1910.—Southern conservation congress; meeting at Atlanta, p. 31-2.
- Timber trade journal, Oct. 22, 1910.—Afforestation in Scotland, by J. S. Maxwell, n. 613.
- Timberman, Oct., 1910.—Scientific taxation of timber, by F. G. Miller, p. 19; Chances for timber investment in the national forests, by C. DuBois, p. 50-2.
- United States daily consular report, Oct. 19, 1910.—Crosstie industry in United States, p. 247; Prevention of forest fires, by D. I. Murphy, p. 252.
- United States daily consular report, Oct. 26, 1910.—Supply of pulp wood and wood pulp; Canada, etc., by G. Wilbrich and others, p. 337.
- United States daily consular report, Nov. 4, 1910.—Rubber culture in southern Asia, by J. T. DuBois and others, p. 460-2.
- Wood-worker, Oct., 1910.—Tree-felling by machinery, p. 36-7; The walnut burl, by J. V. Hamilton, p. 47-8.

Forest journals

- American forestry, Nov., 1910.—Fundamentals of the fire problem, by H. S. Graves, p. 629-30; How the fires were fought, by F. A. Silcox, p. 631-9; What protective cooperation did, by E. T. Allen, p. 641-3; Forest fires in Washington and Oregon, by C. S. Chapman, p. 644-7; How telephones saved lives, by C. J. Buck, p. 648-51; Forest fires in Washington, by J. Shomaker, p. 652-4; Two million dollars worth burned in one day, by C. C. Andrews, p. 655-6; Fires on the Flathead forest in Montana, by H. H. Chapman, p. 657-8; Random talk on forest fires, p. 667-9; The southern conservation congress, p. 673-5.
- Forestry quarterly, Sept., 1910.—Survey methods and costs for a large area, by E. Wilson, p. 287-93; Logging operations in the province of Quebec, by B. Winegar, p. 294-8; Woods surveying, by J. W. Sewall, p. 299-301; Report of supervisors' meeting at Missoula, Mont., by W. B. Greeley, p. 302-25; Some suggestions on predicting growth for short periods, by J. G. Stetson, p. 326-31; Method of calculating yield in working plans in India, by A. D. Blascheck, p. 332-4.
- Forstwissenschaftliches centralblatt, Oct., 1910.—Einige betrachtungen über den holzverkauf aus dem walde, by Stephani, p. 517-35; Reproduktion forstlicher bestandeskarten, by Dihm, p. 536-40; Der wildschaden und dessen ersatz im Grossherzogtum Baden, by Gretsche, p. 541-56.
- Indian forester, Oct., 1910.—Forestry education in India, p. 557-9; Root infection of *Trametes vini*, by A. H. Khan, n. 559-62; Conference of forest officers on fire-protection held at Poona on July 15th and 16th, 1909, p. 562-6; Notes on works of improvement in the F. M. S. forests, by A. M. Burn-Murdoch, p. 566-71; Determination of the volume of amorphous pieces of wood, by R. S. Troup, p. 571-3; Rate of growth of palmyras, by C. M. McCrie, p. 575-8; *Carallia integririma* and its Assamese names, by R. S. Troup and others, p. 578-81; The world's timber resources, p. 610-19; Dry rot in timber, p. 620-2.

Revue des eaux et forêts, Oct. I, 1910.—A propos du pin sylvestre d'Auvergne, by L. Pardé, p. 597-600.

Schweizerische zeitschrift für forstwesen, Sept., 1910.—Von stiel-und traubeneiche und den eichenbeständen am aareseitigen fuss des Bucheggberges, by H. Landolt, p. 257-64; Aus den waldungen von Rheinfelden, by E. Lier, p. 264-70; Die photographie im dienst des forstwesens, by H. Knuchel, p. 278-81.

Zeitschrift für forst-und jagdwesen, Oct., 1910.—Ueber den verlust an masse und wert bei der aufmessung und dem verkauf des fichtenlangholzes in entrindeten zustande unde die hieraus sich ergebende erhöhung der taxpreise des berindeten holzes, by Borgmann, p. 583-620; Beitrag zur frage der kernholzbildung bei der kiefer, by M. Kienitz, o. 620-9; Versuch zur bewertung von kiefernplanzmethoden, by Möller, p. 629-33.

REVIEWS

A MANUAL FOR NORTHERN WOODSMEN.—By Austin Cary, Superintendent of Forests, State of New York, recently Assistant Professor of Forestry in Harvard University, Cambridge. Published by Harvard University, 1910. pp. xii, 250. Price, \$2.00.

This is the second edition of Mr. Cary's manual, the first, published a year ago, having shown that it met a real demand. Since it was published, the author has left the service of New York. The book is like its author, unassuming, business-like, competent. Mr. Cary's long practical experience as a timber cruiser and forest expert in the northern woods, taught him the woodsman's needs. The compact make-up of the book and its serviceable binding with folding flap mark it at once as a field book. It does not deal with theory, but embodies the things the woodsman needs to know and to have at hand in his field practice. A brief statement of its contents is therefore its best review.

Part I deals with land surveying, describing the instruments, their use, and methods of work, both in field and office. Part II covers in the same practical way the making and use of forest maps. Part III covers the important subject of log and wood measurement. All the different rules for cord and board measure are fully explained. This is followed by timber estimating in Part IV, in which we find a description of the instrumental helps, height, measurement, volume tables and tree form; and the practice of timber estimating for small and valuable tracts, and for larger and less valuable tracts by the type and plot, strip, and line and plot systems. The fifth part is given to tables relating to the other parts and to miscellaneous tables and information.

Forest Trees of the Pacific Slope

From the frequent applications to the Forest Service for copies of "Forest Trees of the Pacific Slope," by Dr. George B. Sudworth, Dendrologist of the Forest Service, it does not seem to be generally understood that the limited edition, available for distribution by the Service, has been exhausted. The only way now to procure copies of these books is to send postal money order for 60 cents (stamps and personal checks are not accepted) to the Superintendent of Documents, Government Printing Office, Washington, D. C., from whom they can be obtained at all times.

"Forest Trees of the Pacific Slope" is the first volume on North American forest trees to be published by the Forest Service. In course of time it will be followed by three others, which will deal with the trees of the rest of North America. The "Trees of the Pacific Slope" is the most complete work of its kind so far offered to the general student of forestry, and its price places it within the reach of many students who do not find it convenient to purchase more expensive publications on forestry botany. Dr. Sudworth's book is fully illustrated with natural-size plates.



STATE WORK

Indiana Forestry Association

The Indiana Forestry Association, the organization of which, with the names of the incorporators, was mentioned in these pages last month, has issued an address to the people of the State, signed by the President, former Vice-President Charles W. Fairbanks, and the Secretary, George B. Lockwood. This address is as follows:

Indianapolis, November 14, 1910.

The subject of forestry has come to be one in which the people who give thought to the future welfare of our State are deeply concerned. The rapid denudation of our forests; the consequent impairment of our timber supply; the destruction of our soil over considerable areas; the gradual diminution of our water level—suggest to all public-spirited citizens the necessity of some concerted action to arrest further unnecessary destruction, reclaim the waste places and make provision for forestation so far as it may be practicable. We must not further sin away our day of grace; we must not suit supinely by and see our State further impoverished with respect to one of our richest inheritances. We owe it to ourselves, our children and our State to inaugurate a system of education with regard to our trees and our forests; and adopt measures which shall conserve what we have so far as may be done consistently with our commercial needs, and take steps towards growing trees wherever it can be done to advantage. This is neither the concern nor the work of the few; it is a matter of vital interest to every citizen of the State, and should enlist the earnest co-operation of the many. Our progress will necessarily be slow for a while, but if we go about it in the right spirit and realize that it is a work of the highest public moment, it will nevertheless be sure. The need is at hand and every day's delay will simply increase the difficulty of meeting it later; it is neither the part of economy nor patriotism to further postpone taking up the subject in a broad-minded, scientific way. Procrastination will simply result in intensifying the gravity of the situation and the difficulty of putting the great subject upon a rational, sound basis. Every new tree added to our timber supply, every one saved from ruthless destruction—will be a blessing to the future, a source of health and joy to our people, and wealth to the State—to serve which should be a part of the religion of us all. We should no longer play the part of the spendthrift—utterly heedless of tomorrow.

We regard it of prime importance that the young men and young women of the State

should be educated upon the subject of forestry, and to that end we hope to have the generous co-operation of schools, colleges and universities. If we are to put forestry on a sound and permanent basis in Indiana, it must be done in a considerable degree by enlisting the assistance of the new generation. We appeal to men and women in every avenue of activity to give to the movement their heartiest assistance. With it we shall not fail to render service of lasting benefit to every neighborhood within the State. The press of Indiana, which is loyal to her interests, must be relied upon to aid in the work of educating the people as to the necessity of giving forestry more earnest consideration and aid in impressing upon their minds the fact that the work is of present importance.

We appeal to all public-spirited citizens for their co-operation. The measure of our success will depend upon them. Any one in good standing and in accord with its object may join the association by signing and forwarding to the Secretary at Indianapolis the following application for membership, accompanying the same with one dollar in cash or check:

To the Secretary of The Indiana Forestry Association, Indianapolis:

Feeling an interest in the subject of forestry in Indiana, and being in hearty accord with the purpose of The Indiana Forestry Association, I hereby request to be enrolled among its membership. I hand you one dollar in payment of dues until December 31, 1911, and agree to pay one dollar annual dues thereafter as provided by the by-laws.

(Signed)

P. O. Address.....

County

Indiana.

Date:19..

Every portion of the State should be fully represented in the association. We wish to reach every neighborhood. Each member will be kept advised of the progress of the work of the association.

This is essentially a matter of State concern—yet it is in the best sense of national moment; for as we conserve the interests of Indiana, we shall contribute to the strength of the entire country.

CHARLES W. FAIRBANKS,

President.

GEORGE B. LOCKWOOD,

Secretary.

The new association has strong support and seems to represent a real awakening of interest in this subject. In a recent meeting at Anderson, Professor Thomas, of Wabash College, said:

It is not the purpose of The Indiana Forestry Association to reforest the State or recommend even the covering of rich agricultural lands with trees. It is their purpose to urge the replanting of woodlands in large tracts wherever they occur, and in small tracts on a very large percentage of the farms of the State. A farm woodlot on every farm will be one of our movements.

Commenting upon this the *Indianapolis News* remarked:

That is well for a beginning—and well begun is half done. If we can get the old wooded tracts replanted—as Gifford Pinchot urged that they so much needed to be; arouse an interest that will make a wooded tract a feature of every farm, we shall do a work of inestimable magnitude. But we should say that as the work goes on it will spread. There is no reason why we should not have all city streets and the "better roads" of the State (which was also a subject of the association's solicitude), lined with trees. In short, attention once turned to the subject, the work will grow beneath the hand. There are practical questions of moisture—misunderstanding of which has been one of the causes that have brought about the denudation of the soil. The farmer begrudges the moisture that the trees draw and wants to save it for his crops by cutting the trees away. But if accepted theories are correct, he at once cuts away cause as well as effect, since more trees would hold as well as draw moisture.

But all this is a detail that the expert and learned opinion of the work will be able to settle. The practical thing now is to replant the wooded tracts and to draw popular attention to the whole subject; to spread popular knowledge; to make Arbor day a great day, a day of public celebration, so that tree planting shall become general.

The *News* further notes the systematic way in which the whole Belgian people once enlisted in reclothing the country with trees, making it a national festival, and says in conclusion, that of all the forms of conservation "none is of greater importance for Indiana than reforestation. It is a patriotic duty that every citizen owes this State to take an interest in it."

This fine spirit will surely accomplish results. The new association can be assured of the heartiest good wishes and support of the American Forestry Association.

Forest Fire Conferences

The Lake States have been thoroughly aroused by the fires of this past season and conferences to deal with the fire question

seem to be much in order. In addition to the Michigan meeting, which resulted in the formation of the Northern Fire Protective Association, which we have referred to elsewhere, a meeting was held at Bemidji, Minnesota, on the 11th of November, under the auspices of the Northern Minnesota Development Association, to frame a bill for the protection of the timber lands of Minnesota, this bill to be submitted to the Development Association at its meeting in Brainerd, December 2nd.

Broader in scope than either of these, however, is the Lake States Forest Fire Conference which is to be held in St. Paul, December 6th and 7th. At this conference the Governors of the three States are to speak. Governor Eberhart of Minnesota, is to speak on the State's duty in preservation of its forests; Governor Warner of Michigan, on Michigan's forestry policy, and Governor Davidson of Wisconsin, on what the forests mean to its people. The program of this meeting has been shaped by the Minnesota Forestry Association and the discussion will be broad and thorough. National and State forest officials and timber land owners will be present and it is believed that much good will result from the gathering.

A Generous Forest Gift

Joseph Battell, of Middlebury, Vermont, has offered to Middlebury College ten thousand acres of wild land in the towns of Hancock, Goshen and Ripton to be used for a school of forestry. He believes that with such a demonstration forest close at hand Middlebury would be in a position to do good work for higher education in forestry.

Mr. Battell has already given to the public a large tract for a park and has offered the United States Government a tract on Lincoln Mountain in Warren, 4,000 feet above sea, worth \$100,000, if the Government will spend as much improving it. He believes New England, which shares but little, and Vermont especially, which shares hardly at all, in the money expended by the Government for public improvements should have a government reservation, so he offers this splendid tract of land, attaching to the gift no conditions except that the Government shall expend \$100,000 on the property when acquired.

Mr. Battell is the largest individual landowner in Vermont. It was through his interest, generosity, and faith in the Morgan horse that the Government breeding station was established in Weybridge, Vermont. He is a gentleman of active and efficient public spirit.

EDUCATION

Forestry Essays in the Schools

One of the most promising things for the future of forestry in this country is the growth of the movement to instill its principles and interest in it into the minds of young people. After all, when the reformers of today have done and said everything that they can, the future lies with the rising generation more than with that which now handles the controls. In Indiana the State Board of Forestry offers prizes for essays on forestry by pupils of the schools of the State. The same thing has been done elsewhere. But this is not the best part of it. The really heartening fact is that the children themselves are easily aroused to an enthusiastic and intelligent interest, if they are approached in the right way.

As an example of this thoughtful interest the accompanying paper, by a girl of fourteen in the public school of Fessenden, North Dakota, is worth reading. It is also worth while to consider the value of leading hundreds of thousands of those young people who will have the grave economic problems of the future to wrestle with to thinking along these lines.

WHY PLANT TREES?

By *Esther Macdonald*

The question of "Why Plant Trees" is a great topic of discussion throughout our nation. Many men versed in forestry have been employed in the conservation of the forests. There are numerous reasons for planting trees and for preserving them after they are planted.

It would be a very dull nation indeed that had no forests. Animal life as well as the nation in general is largely dependent upon forests. The forest is the home of the bear and many fur-bearing animals. The furs of these animals bring the United States many thousands of dollars each year. The forest is also the home of the deer and the huntsman would not have the pleasure of hunting this animal if there were no forests. Beside the animals living in the forests there are many fish which live in the fresh-water streams, many times the result of forests. The fish are worth great sums of money and I think that every person who enjoys fish would regret very much to see them destroyed.

Everyone needs a house to shelter him and this he would not have but for the forests. We employ many men and women to work in the field harvesting grain, to work in the

factories making articles to use in our own country and to export to other countries, but the question arises, "How are we going to get them over to the other countries?"

We must have something to carry them over in; they will not float like Ivory Soap. The answer quickly comes, "Why, vessels, of course." But where would we get the many wonderful vessels that we possess if some trees did not forfeit their lives to furnish the lumber for them. Many forests are denuded for the purpose of furnishing poles for various telephone and telegraph lines, and while this may seem a deplorable fact, it is a commercial necessity. The pencils and paper which we use in our schools are derived from trees.

Did you ever stop to think that forests are a source of health? When the pure air is taken into the body it becomes gaseous or impure and when breathed out is called carbon dioxide. The forests breathe in the carbon dioxide which we breathe out and in return breathe out fresh air or oxygen.

The forests have a great deal to do with the climate of any country. They serve as wind-breaks and in summer when the weather is exceedingly warm, what is more pleasant than to crawl away from the outside world with an interesting book and spend the hottest hours of the day in some shady nook well surrounded by trees?

The soil of the forest is very porous or sponge-like. It absorbs the moisture and gives it up as it is needed. The origin of many large rivers is from the forests. First we see a bubbling, sparkling spring formed in some wood and perhaps many miles away that little spring has created a large river. Thus our water supply is largely dependent upon forests.

In the earth are many minerals which, when the water flows through them, purify the water and make it fit for drinking purposes.

The buzz of many factories would be forever hushed if forests were abolished. Many of the things which we wear are made in factories whose machinery is run by water. The number of factories in our country would be greatly decreased if there were no forests. As it takes water to carry a vessel we need many rivers to transport our goods from place to place. Water transportation is much cheaper than railroad.

The United States uses much more lumber than the forests produce, in fact they use three and one-half times as much. We are sorry to say that the countries of Europe have conserved their forests more than we.

the citizens of the United States, have. Some of the foreign countries have only enough lumber for home consumption while some have not enough and must import. Why should the United States produce so little lumber? It has plenty of land and excellent soil for growing trees. It is because the people of the United States have been constantly destroying what in former days were large forests. It will take several years to replace these forests. Many people who plant trees will possibly meet with failure because of their ignorance of how to do it, but after they have studied out their mistake let them replace the trees that failed and they will probably meet with better success the second time.

We are surprised to learn that of all the forests of the United States four-fifths are owned privately. The owners of these forests ought also to comply with the laws governing United States forests. Owners should see that all decayed and dead branches are removed as they obstruct the growth of the young trees. The trees should not be cut down until they are of a certain age because the lumber is not very good and this would be very wasteful indeed.

Many forests have been ruined by fire. Extreme care should be taken on the part of every person to prevent these fires. Sometimes picnic parties select a wooded place as their picnic grounds, build little fires to cook some of their food and after they have finished their merry-making and departed to their homes one might see a wavering line of blue smoke arising from the place where the picnickers had built their little fire. If there happen to be any dry twigs or branches near this fire it will not be long before one might see little tongues of flame reaching out to grasp all within their reach and this is the way the fire spreads until after a while the whole forest is ablaze and the people who resided near-by would be seen running panic-stricken out of the way of the angry forest fire. Trees would be falling upon each other, one might hear branches and twigs snapping as the leaping, roaring fire takes them as its victim.

The New England States have been very successful in planting trees and so has Prussia. The United States has trees both in the eastern and western parts, but the middle northwest is very needy in this respect. Wherever there are trees the land is always worth more than where there are none, because the forests retain the moisture and soil. This soil is much better than the dry, hard, baked soil of the prairies. The soil of the prairies is good in itself, but might be bettered if there were more moisture. To get this there ought to be more forests.

Vegetation depends largely upon moisture and moisture depends largely upon forests.

As forests serve as wind-shields all North Dakota people should be very interested in planting trees, for the wind is exceedingly strong here at times. The wind dries up the moisture in any treeless country, but the moisture can be retained for a great length of time in a wooded country.

The parts of our country that are wooded are famous for their beauty, such as California, Wyoming, and other States. An unwooded country cannot be compared with a wooded country because the wooded country is far more beautiful and fascinating. It usually has better soil and more moisture than the unwooded. It is pleasanter to the eye, as it roves over the earth's surface, to see beautiful trees with occasional springs and streams here and there, than to see nothing but treeless plains as far as the eye can see.

The foregoing reasons are the most prominent for having forests and for preserving them. The State of North Dakota is a pleasant place to live in, but its lands might become more valuable and more pleasant to live upon if forests were planted and preserved.

The Indiana Prize Essays

To encourage the study of forestry among the pupils of the public schools the Indiana State Board of Forestry offers four prizes of \$10.00 each for the best essays on forestry. The contestants for the first prize are limited to the pupils of the seventh grade country schools. The second prize is for the pupils of the eighth grade country schools. The third prize is for the members of freshman and sophomore classes of the high schools of the State. The fourth prize is for the members of the junior and senior classes of the high schools. The conditions are as follows: The subject must be: "To what extent should Indiana be reforested; give reasons." The essay must be a handwritten manuscript in ink, containing not more than one thousand words. The essay must be in the hands of the Board on or before May 1st, 1911. Former prize essay winners are not eligible. The essays are to be graded on the basis of 70 points for thought, 30 points for composition, manuscript, etc. The Board wishes original thought and no credit will be given contestants who copy verbatim works on forestry. If direct quotations are used they should be indicated by quotation marks and their source given in a foot note.

STATISTICS

The Census Returns of Production from Forests

The present census will give fuller and more complete statistics of wood products than the country has ever had. Incidentally it may be remarked that these statistics will give striking confirmation at many points to the contentions of the advocates of conservative forestry as an economic necessity. The figures hitherto available have not had the advantage of the organization and close canvass of a general census, so that they have necessarily been incomplete and the blank spaces have had to be filled by estimates. This does not detract from their substantial correctness and their value in ascertaining general principles, but confirmation of conclusions and a means of checking results are sought through the collection of the fullest possible data.

The Census Bureau has issued preliminary comparative reports for the years 1907, 1908, and 1909, on the production of lumber, lath, and shingles, and on the wood-pulp and cross-tie industries. These reports have been in charge of J. E. Whelchel, expert special agent of the division of manufactures, and have been prepared in cooperation with the Forest Service. Through the same cooperative arrangement between the Forest Service and the Census Bureau annual statistics are published relating to the group of lumber and timber industries.

LUMBER

The lumber cut in the United States during the calendar year 1909 was 44,585 million feet, board measure, as against 33,224 million feet in 1908, and 40,256 million feet in 1907. This was an increase of 34.2 per cent. over 1908, and of 10.8 per cent. over 1907. The output of lath and shingles during 1909 was 3,712 million and 14,945 million, respectively. The increase in the production of lath in 1909 over 1908 was 24.3 per cent. and over 1907 1.3 per cent., while the corresponding increases for shingles were 23.4 per cent. and 26.4 per cent.

The relatively large increase in the number of mills reporting for 1909, together with the increase in the cut for that year, was largely due to the fact that the field force of the Census Bureau, which was engaged in gathering statistics of all branches of manufacture throughout the United States, secured returns from practically every sawmill in operation during the whole or any part of 1909, without regard to its size, and in this way there have been included many

small mills not covered by the mail census in the preceding years.

Yellow pine, including the several species, longleaf, shortleaf, loblolly, Cuban, etc., produced in the coast states from Virginia to Texas, and in Arkansas and Oklahoma, maintains a growing predominance in the total cut. The total output of these comprised 44.3 per cent of the total in 1907, 45.3 per cent. in 1908, and 49.5 per cent., or over twenty-two billion feet in 1909. The returns show nearly double the number of mills in the yellow pine states as compared with 1908, a result due probably to reaching the small mills in remote localities by means of the personal canvass of the general census.

The limited output of mills of this class and size, however, is almost without exception consumed in the immediate vicinity of its manufacture, and hence exerts little or no influence on supply and prices in the general lumber market of the country.

The proportion of the total lumber cut by New England and New York declined from 9 per cent. in 1907 and 9.6 in 1908 to 7.5 in 1909, spruce and white pine still occupying the first place in this region. The Lake states also continue to decline in relative importance. They furnished 13.6 per cent. of the total cut in 1907, 13.2 in 1908, and 12.3 in 1909.

The output of the Pacific coast states was 28.3 per cent. larger than in 1908 and 2.2 per cent. larger than in 1907, but the proportion to the total was less than in either of the two preceding years, being 15.5 as against 16.2 in 1908, and 16.8 in 1907. Douglas fir is the leading timber tree in this region, being nearly four-fifths of the product of Oregon and Washington. Redwood forms nearly half of the production of California.

Of the total production of lumber in 1909, softwoods supplied 33,875 million feet, of 76 per cent., while hardwoods contributed 10,693 million feet, or 24 per cent. Softwoods contributed 1 per cent. less of the total production in 1909 than in 1908 and 1907, in each of which years they formed 77 per cent. of the total.

The species which produced over three per cent. of the total cut in 1909 were yellow pine, which has a long lead, with 36.5 per cent.; Douglas fir, 10.9 per cent.; white pine, 8.8 per cent.; oak, 10 per cent.; hemlock, 6.8 per cent.; spruce, 3.0 per cent., and western pine, 3.4 per cent. The states contributing over one billion feet of the total production in 1909, in the order of produc-

tiveness, were: Washington, Louisiana, Mississippi, North Carolina, Arkansas, Virginia, Texas, Wisconsin, Oregon, Michigan, Alabama, Minnesota, Pennsylvania, West Virginia, Georgia, Tennessee, Florida, California, and Maine.

CROSS-TIES

In 1909 the total number of cross-ties reported as having been purchased, was 123,754,000, costing \$60,321,000 at the point of purchase, as compared with 112,463,000, costing \$56,281,000, in 1908, and 153,700,000, costing \$78,959,000, in 1907. The latter year does not, however, represent the true standard of comparison, as it was one of unusual railroad development. The decrease in 1908 was about 26.8 per cent., but in 1909 the balance swung back to 80.5 per cent. of the 1907 record, and was, as stated, an increase of about 10 per cent. over 1908. While there was considerable variation in the number of cross-ties purchased during the three years, the average cost per tie remained close to 50 cents.

A significant feature is the fact that in 1909 there were 16,437,000 cross-ties reported as purchased for new track, as against 7,431,000 in 1908, and 23,557,000 in 1907.

The purchases by steam railroads formed about 93 per cent. of the total in 1909 as compared with approximately 94 per cent. in both 1908 and 1907.

The principal kinds of wood used in the manufacture of cross-ties in the ranking order in 1909, are: Oaks, southern pines, Douglas fir, western pine, cedar, chestnut, cypress, tamarack, hemlock, redwood, white pine, lodgepole pine, gum, spruce, and beech, and the remaining varieties are grouped together in an "all other" class.

WOOD PULP

There were 253 wood-pulp mills in operation during the whole or part of the calendar year 1909 in the United States, as against 251 in 1908. The consumption of pulp wood in these mills during 1909 was 4,002,000 cords, as against 3,347,000 cords in 1908, an increase of about 19 per cent. Since 1907 there has been a decided decrease in

the consumption of the best known and highest priced pulp wood, namely, spruce, this species contributing 68.1 per cent. of the total in 1907, 64.5 per cent. in 1908, and 60.5 per cent. in 1909. There has also been a slight decrease in hemlock, whereas corresponding increases have occurred in the consumption of woods heretofore little used as pulp material, such as balsam, white fir, and several hardwoods, including birch, beech, maple, gum, and basswood. This increase is especially marked in the case of balsam, the quantity of this species consumed in 1909 being more than double that reported for 1908.

The steady decrease in the annual consumption of spruce has been accompanied by a substantial increase in the average cost per cord of this species. As indicated by the figures, this was \$8.90 in 1907, \$9.33 in 1908, and \$9.96 in 1909.

The tendency to use the woods less highly considered in pulp making becomes more marked as the cost of spruce increases and the available supply is reduced. White fir, which is separately shown for the first time in 1909, is one of the woods of good quality for pulp which has been utilized only during recent years. It is very common in the national forests, and at present has a rather low value, due both to the lack of knowledge of its pulp value and to the lack of other uses for it. The development of the use of this wood for pulp will mean much for the national forests' management, for it will make it possible to dispose of much material for which there has hitherto been little demand.

The advancing cost of pulp wood of all species is clearly brought out in the report. The total consumption in 1909, though exceeding that of 1907 by less than 40,000 cords, cost over \$2,000,000 more.

The quantity of slabs and other mill waste consumed as pulp material was substantially the same in 1909 and in 1908, about 250,000 cords in each year, which, however, was a material increase in the consumption of this character of material over 1907 when 193,000 cords of it were reported as used.

The reported total production of air-dry pulp in 1909 was 2,491,406 tons, as against 2,118,947 tons in 1908 and 2,547,879 tons in 1907.



NEWS AND NOTES

TO PROTECT LONG ISLAND

Bringing a Railroad to Obey the Fire Law of New York

Some of the public-spirited residents on Long Island, New York, have for two or three years been endeavoring to secure the Island against the forest fires that so seriously menace all wooded property. Long Island is peculiarly liable to visitation by fire because it is traversed by three lines of railway, in its fifteen miles of width, one through the middle of the Island, one on the north and one on the south shore, while its width is swept by strong sea breezes from both the north and the south. As a result of the efforts of a number of residents, the leader of whom is Charles M. Higgins of Brooklyn, who has a summer residence at Smithtown, two suits against the Long Island Railroad Company, have been fought and won. The story is told in a pamphlet report by Mr. Higgins to his neighbors and fellow land-owners.

The first case was brought by the Forest, Fish and Game Commission of New York, in response to a petition signed by sixty land-owners of Smithtown and the adjacent country, among them being Judge (now Mayor) Gaynor and former Forest Commissioner Edward Thompson. In his report Mr. Higgins says:

As the result of our petition to the Forest, Fish and Game Commission of the State, as you are aware, one suit was brought by the State of New York in July, 1907, for over \$100,000 in penalties incurred by the railroad company for its flagrant failure for many years past to observe the forest laws of the State for the prevention of fires through forest lands along its right of way.

Another suit had been previously brought by myself personally for damages suffered by a destructive fire caused by the railroad company in my woodlands on April 19, 1906, when over thirty acres of forest were destroyed. * * *

One of the most important points in the forest laws of the State on which suit was brought was the clause requiring railroads to cut and remove at least twice a year all grass, brush or other inflammable material along its right of way through forest lands or lands subject to fire from any cause—a law which we all know has been utterly disregarded for years by the railroad company. The answer of the railroad company to this suit was a demurrer, denying that the Forest Commission had any jurisdiction in this county, and that the law applied only to State reser-

vations or public forests or parks, and in no sense to private woodlands. This question was carried through every court by appeal up to the Court of Appeals, and in each court this law was sustained and the railroad company defeated, it being now the fixed law of this State, as defined by the Court of Appeals, that all railroad companies must clear their right of way at least twice a year of all grass, brush or combustible material along forest lands or lands subject to fire, whether these lands are public or private, under a penalty of \$100 a day for its neglect to do so. The law being now settled by our highest State court, this suit by the Forest Commission will now be tried on the facts and merits at the next session of our Suffolk County Court for the collection of said penalties.

In addition to this decision of the higher courts enforcing this specific forest law, the lower courts, in my own personal suit, have decided in two decisions, first by Judge Crane and then by Judge Jaycox, that the railroad company is bound by common law, even without specific statute law, to keep its right of way properly cleared of all combustible matter and where it fails to do this, and a fire results therefrom and passes to adjacent land, the railroad company is guilty of negligence and liable for damages, and my personal suit was won mainly on that point, which is a new and most valuable legal point now settled against the railroad companies, both as statutory and common law in this State.

Mr. Higgins then proceeds to point out the substantial gain which the decisions in these cases represent, and that whereas hitherto prosecution has been too expensive a luxury for the individual landholder to indulge in, because of the difficulty of making a case, now "legal conditions are quite radically changed all along the line to the advantage of the public by the victories won in these two suits, and also by the new laws passed by the last Legislature, which now promise to make it more expensive for the railroads to neglect proper precautions and defy public right and safety than to keep their engines and right of way in such condition as will prevent bad forest fires in the future."

In the suit of the Forest Commission against the railroad a verdict for \$32,500 was given to the State against the Long Island Railroad Company. A motion made by the railroad to set aside this verdict, on technical points, had not been decided when this article was written, but it was expected

that it would be denied and that the railroad company would fight the case up to the court of last resort.

Northern Forest Protective Association

At a meeting of prominent Michigan timber land owners in Marquette, November 5, the Northern Forest Protective Association was organized. This association has for its object, as stated in the article of incorporation, "The preservation of the forests of the States of Michigan and Wisconsin generally and particularly from loss by forest fires, and the enlistment of the aid of the United States of America and the States of Michigan and Wisconsin in preserving said forests and preventing their destruction by fire, and all other objects which will promote the main objects as herein set out or incident thereto."

The chairman of the meeting was Thornton A. Green, of the Greenwood Lumber Company of Ontonagon, and the secretary, W. C. Howe, of the American Lumbermen. The meeting was addressed by J. C. Sherman, of Marquette; Thomas B. Wyman, for-ester of the Cleveland Cliffs Iron Company; A. E. Miller, attorney for the J. C. Ayer estate, of Marquette; R. S. Kellogg, of Wausau, Wisconsin, secretary of the Northern Hemlock and Hardwood Manufacturers' Association; C. H. Worcester, of Chicago, of the Worcester Lumber Company; F. H. Smith, of Traverse City; A. F. Kolpcke, of Marquette, of the Peter White Land Company, and H. R. Harris, of Marquette, of the Munising railway. The following officers were elected: President, T. A. Green, Ontonagon, Michigan; vice-president, C. V. R. Townsend, Negaunee, Mich.; secretary, T. B. Wyman, Munising, Mich.; treasurer, J. C. Sherman, Marquette, Mich.; directors, C. H. Worcester, Chicago, Ill.; G. A. Goodman, Marinette, Wis.; W. H. Johnson, Ishpeming, Mich.

In accordance with the method of similar associations, the expenses are to be defrayed by assessments levied by the directors upon the total acreage of timber lands of the members.

Insurance Against Loss by Forest Fires

A recent news item from Canada records the insurance by Lloyds, of London, of six thousand square miles of timber lands against loss by forest fires. This, the first insurance of the kind ever effected on this continent, so far as we know, has been taken out by one of the largest timber land owners

in the province of Quebec, Price Bros. & Co., Ltd., of the city of Quebec. This new form of insurance was brought to the attention of financial circles in Montreal and Toronto recently when Price Bros. announced the issue of \$5,000,000 of five per cent bonds on their properties. The issue is to cover the expansion of their lumber business into a paper making company, with a 150 ton newspaper mill now being built by Jonquieres, Que., in the Lake St. John region, where they are developing 15,000 horse-power. The insurance of their enormous holdings of timber lands against fire is intended as additional security to the bondholders. It covers a term of thirty years.

Insurance of timber lands against loss by fire has been regarded as impossible except at prohibitive rates. It has remained for the redoubtable and untterrified Lloyds to prove the contrary. Timber land owners will be interested to know the terms on which this insurance was placed.

The Taxless Town

There is a little town in Sweden by the name of Orson. Orson. And Orson is one of the greatest towns in the world.

Of course Orson isn't as BIG as London, or New York, or Bagdad, or perhaps Oshkosh. But Orson has done something that none of the so-called "great" cities of the world has ever done.

Orson has dodged all local taxes—successfully and honestly.

The Orson railway is free to every citizen of the town.

The telephone service is free.

Schools and libraries cost the citizens absolutely nothing.

All because, a generation or two ago, the patriotic people of Orson planted trees. Orson has a municipal forest that has yielded the town \$5,000,000 in the past thirty years.

And the \$5,000,000 has paid the running expenses of the town.

Of course there isn't anything to hinder any American town from doing the same thing. But we don't notice any American town doing it. To date Milwaukee seems to be the only American town that has even thought about it.

But it's worth thinking about, isn't it?

Also it might be worth while to consider at the same time the fact that while Orson was paying her municipal expenses for the past year from the proceeds of her well-kept forest, the American nation, through neglect of her forests, was suffering a loss of two hundred million dollars and more than a hundred lives.—*Boston Traveler*.

